JAMAICA.

IMPERIAL BUREAU
OF MYCOLOGY

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR

THE YEAR ENDED 31ST DECEMBER, 1928.

Ordered by His Excellency the Governor to be Printed.

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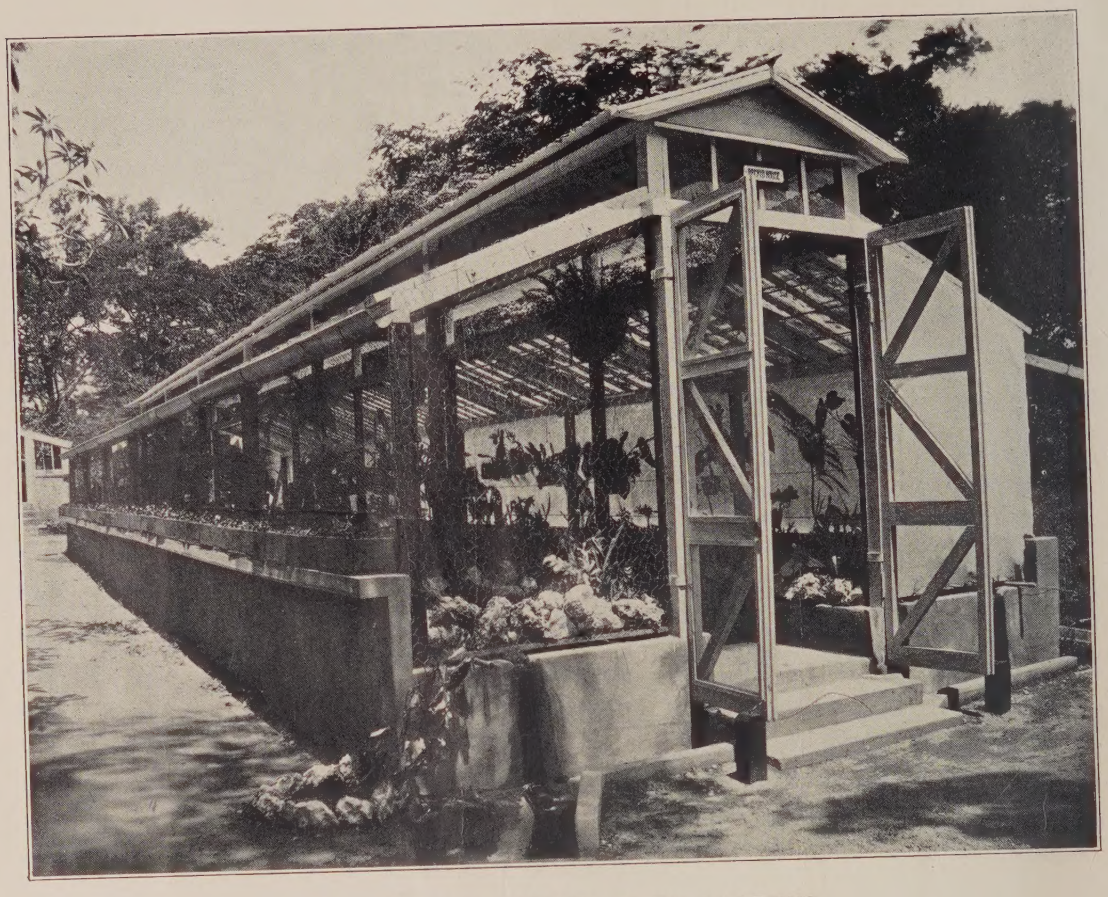

NEW ORCHID HOUSE—HOPE GARDENS

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DEPARTMENT OF SCIENCE AND AGRICULTURE.

REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1928.

I.—GENERAL OBSERVATIONS.

The year 1928, was from the agricultural point of view, a difficult and disappointing one. The high hopes with which the year started were defeated, owing to a very sharp drought which affected bananas and sugar and caused great anxiety to owners of stock, while in the South and Central areas lack of water caused great inconvenience to the people.

The Island rainfall for 1928 was only 63 inches or 13½ inches below the average.

During the hurricane months storms arose with great frequency in the Caribbean and although the alarms were many, Jamaica fortunately escaped the devastating cyclones which did so much damage to several other islands in the West Indies. The usual autumnal gales took a rather heavy toll of the bananas, and the crop was thereby further depleted so as to show a reduction of four million stems on the record production of the previous year.

The drought affected the size and quality of the bananas exported and as a result of carelessness in handling the fruit, Jamaica bananas were somewhat severely "rejected" in foreign markets due to thin and bruised fruit. The Chief Inspector of Produce visited the United States and gained clear evidence that the growers of bananas in Jamaica require to exercise more care in the production and marketing of this fruit in order to compete successfully with bananas from other countries.

Appropriate action has been taken under the Produce Protection Law to protect our fruit by a system of Government Inspection and an Order regulating the export quality of bananas has been issued under this Law to safeguard the position.

Panama Disease was successfully controlled and at a lower figure than had been anticipated from its previous rate of development. No "cure" or remedy for this disease, other than quarantine and the digging out of intervening plants so as to break up the root contacts by which Panama Disease so rapidly spreads from plant to plant in the soil, has been found to be effective.

The position is now capable of statistical study and it is manifest that unless all banana growers unite to deal with the disease faithfully and strictly under the Order, its spread may easily develop into a catastrophe. With the utmost care and fidelity, the time will yet come when the disease will become a factor in reducing the export of bananas from Jamaica to an ever-increasing extent.

The only solution possible for this difficulty is that of a new banana which is acceptable to the trade and is yet immune to Panama Disease.

I am glad to be able to report that encouragement has already been afforded by the Department's banana breeding experiments and that the production of the "New Banana" is already within sight. Already 287 hybrid bananas have been obtained with the "Gros Michel" or Jamaica Banana as parent crossed with edible varieties of Banana that are either immune or resistant to Panama Disease.

Of these, some hybrids of 'Robusta' with 'Jamaica' are of great promise. At present the selected seedlings are being tested in a hot-bed of disease and a fine Robusta-Jamaica seedling is now fruiting on a spot where the Jamaica banana dies out when less than 3 feet in height. The thanks of the Department are due to the Director of Prisons and the Superintendent at Spanish Town for enabling us to grow our collection of seedling bananas on the first class soil of the St. Catherine District Prison Farm.

Credit is due to Mr. J. B. Sutherland for the successful raising of banana seedlings at Castleton Gardens where most of the seedlings have been raised. The Microbiologist has succeeded in raising a seedling in the Laboratory Garden from the Jamaica Banana crossed with the Lacatan—an immune variety now being tried in Central America, but reported to be difficult to handle as a commercial fruit. The experimental station near Hardware Gap, in the Blue Mountains was a failure. Contrary to expectations, we failed to obtain banana seeds at this, the highest elevation in the Island capable of producing fruit from the Gros Michel Banana.

The inter-tropical climate of Castleton Gardens—the only spot in Jamaica where the Mangosteen has fruited—has been proved to be the most suitable for producing bananas from seed. At Hope the results have been meagre, probably due to the dry climate and the hard conditions under which the bananas have to be grown.

All attempts at obtaining seed from the China and the Robusta Banana have failed, although at least 700,000 pollinations have been made. The Jamaica Banana, however, is a fair seed producer, as many as 15 seeds have been obtained from a single bunch of this variety when crossed with immune varieties. This enterprise must now be regarded as the chief concern of the Department. It is recognised that the "New Banana" is a paramount necessity for safeguarding Jamaica's future as the premier banana-producing country of the world, and every effort is being made to produce what is required to effect this.

Coffee continues to offer inducement to producers. The exports remained at almost the precise level of those of the previous year, viz.: slightly less than 9 million pounds, while the value has appreciated about 25 per cent. since 1927.

The demand for coffee plants from the Hope Nursery exceeded our available stock which was somewhat set back owing to lack of water during the severe drought. The nurseries have been enlarged so as to supply a larger number of coffee plants in 1929.

A gratifying feature of the resulting benefits from the new Produce Protection Law, has been that of the improvement of small settlers' coffee. Large numbers of pulpers have been installed and a higher-priced product is thereby produced. In one district, a Co-operative Coffee Society has enabled the small growers to bulk their output and to obtain a much better price for their coffee.

Under modern conditions, coffee is an attractive home-product for cultivation by the peasantry. It is hardy and withstands drought. It responds to mulching and animal manures. It provides labour for children and young persons. This staple can safely be extended. The Agricultural Society and the Department are co-operating effectively in this matter and if we persist on present lines for the next ten years the export of coffee should rise to 20 million pounds per annum.

In the Blue Mountains area, while the large estates have no great scope for enlargement on their own fields, they are effecting a substantial extension of the industry by buying Cherry Coffee from smaller growers and manufacturing this into the high-grade coffee which commands the highest price in the market.

Cacao was affected by the drought and fell to a little over 5 million pounds in weight. The quality of the common Jamaica "Ordinary" Cacao has decidedly improved owing to the enforcement of the Produce Protection Law by the staff of Inspectors. Planters generally are not inclined to extend their cultivation of cacao owing to the small profit attaching to its sale at recent prices and our nurseries of cacao plants are at a low ebb in consequence.

Coconuts.—Owing to the effects of drought, there was a slight drop in the exports of both coconuts and copra. A beginning has been made with the local industry in Coconut Oil. Two factories have started and find a ready output for their oil in the local market. The copra cake has been tested at the Hope Farm and found to be wholesome and nutritive both for milch cows and young stock.

The Government Laboratory produced a clear oil of full coconut flavour, which was also of good keeping quality, by filtering the crude oil through a Stream-line filter after removing the free fatty acids with a little alkali.

The local consumer prefers a flavoured oil to the refined product provided that the coconut oil does not go rancid on keeping. No serious outbreaks of Coconut Disease were discovered during the year. The deterioration of groves due to unsuitable soil conditions continues to give trouble in various parts of the Island.

Sugar failed to realise expectations. A crop that was originally placed at 60,000 tons, only yielded an export of 48,714 tons of sugar due to drought. Prices were also low. With the failure and abandonment of crop restriction in Cuba, the industry is now faced with severe competition and a period of low prices. A bold effort is being made to meet this situation in Jamaica by increasing the output of the fields. Deep cultivation by mechanical tillage and the selection of improved canes have combined to raise the yield on large areas of sugar lands by at least 25 per cent.

Until about 1920, no seedling sugar canes that had been tested in Jamaica could effectively replace the "White Transparent." During recent years, certain canes from Barbados and Java have been produced, which are definitely superior in all respects to the old Jamaica cane. For the best soils and climates, 'B H (10) 12' gives large tonnage and rich juice. For dryer areas 'S.C. 12/4' is superior to the former cane in tonnage and nearly equal in quality of juice. On heavy soils with adequate water or rainfall 'Ba 11569' has more than doubled the yield of White Transparent. It is a first class factory cane and is recommended.

As a substitute for Uba Cane, where Mosaic Disease is rampant, the Java cane 'P.O.J. 2725, is to be recommended. This cane requires early fall—planting for the best results. It is a strong grower and yields a rich juice. The Hawaiian cane 'H. 109' is a magnificent variety but requires plenty of moisture. Under dry conditions in Jamaica it becomes hollow in the centre. It can only be recommended for planting where conditions are most favourable for free and unrestricted growth. A revival of interest in Manurial Experiments has been shown by the sugar planters. Experiments have been recorded on a few estates. These in general, support previous experience that Sulphate of Ammonia is the first and most effective fertiliser to be used at a profit on a cane-field in Jamaica.

The problem of Rum remains a difficult one, although the trade was rather greater than for 1927. Recently definite steps have been taken to put the better cane lands in Jamaica into bananas, pending an improvement in the markets of the world for sugar. The prospects for the future are, therefore, for a reduction in the output of sugar until this staple again becomes attractive to the producer. There is, however, a definite area of sugar land where the banana can not be grown successfully and the productive capacity of these lands under present conditions may be set at about 35,000 tons of sugar per annum, in addition to local requirements.

Ginger was affected by the drought conditions, particularly in the Central Zone and the crop was short of last year by about 25 per cent. A good deal of interest has recently been taken in the improvement of their cultivations of ginger by the country growers and with fair prices and average seasons, larger crops may be expected in the near future.

Citrus fruits showed a marked increase in the case of grapefruit which rose from 80,000 to over 100,000 boxes. The Hope Nursery issued a large number of budded varieties of choice commercial varieties of oranges and grapefruits besides many thousands of our special seedling strain of grapefruit. Hundreds of trees of these seedling grapefruits are now fruiting and it has been found that the fruits are excellent and superior in flavour to the standard commercial grapefruits. Should any individual seedling trees be found unsatisfactory it will be simple to bud them with a selected variety. I am satisfied that we have made no mistake in issuing these thousands of seedling grapefruit plants and that they will ultimately assist Jamaica to supply a cheap grapefruit of good flavour with which we should be able to enlarge our hold on the English and Canadian markets.

Honey suffered from the unfavourable seasons and the exports contracted by about one-sixth in consequence. The Honey Industry of Jamaica is greatly in need of organisation and co-operative marketing. The Produce Protection Law has legislated for honey and the Agricultural Society has appointed a special Instructor in Bee-keeping, who has made a favourable beginning in organising a better standard of operation among the owners of apiaries both great and small.

No cases of Foul Brood were recorded during the year, and the measures taken in 1927 in the Kingston area appear to have been effective.

Logwood is in a condition of suspended animation and the local factories are still operating on a modest basis of output. There are technical difficulties of manufacture, competition with synthetic dyes and trade rivalries and combinations which are collectively responsible for the depression in the logwood trade. It is difficult to suggest any means of improving the present situation which is not satisfactory to the interests of Jamaica. The logwood trade provides much labour and affords revenue to many estates that are not otherwise well provided with money-products, and its revival would be of wide and definite advantage to the Colony.

Tobacco.—The export cigar trade has remained steady, while the production of local cigarettes has increased due to the Tariff changes. Attempts are being made to grow and cure Virginian and Turkish Cigarette Tobaccos.

Animal Diseases.—No case of Anthrax or of Foot and Mouth Disease occurred during the year.

Livestock.—The year was a difficult one for stockowners who experienced a lack of feeding in the pastures and frequently also a lack of water for watering the stock. "Grove Place" in the centre of a drought-stricken area, demonstrated the value of adequate water catchment and storage, for although the water reserves fell low, they proved to be adequate for requirements.

Greater water-storage is clearly a matter that requires immediate attention in this part of the Island by the Parochial Authorities and individual landowners, both great and small.

At Hope Farm, a remarkable demonstration of the value of ensilage was afforded. Owing to drought, the water supply was reduced to the barest minimum while all the pastures were burnt up and almost devoid of feeding for the stock. With 600 tons of Guinea Corn silage in the 3 concrete Silos, the 350 head of stock at Hope were maintained in good condition. At the peak of the severe drought the record milk production of the Farm was made, viz.: 641 quarts per diem.

The Grove Place Stud Farm has been reduced to a thousand acres by the sale of over 2,000 acres to the north and south of the homestead for purposes of land settlement. The reserved area is sufficient for the requirements of the Public Stud Farm, with a modicum of 200 head of farm stock to repay the cost of upkeep of the property. A total stud service of 2,354 mares, she-asses and cows has been effected at Grove Place since it commenced in 1921. A valuable distribution of good blood has thus been effected among a large number of owners of stock all over the Island.

The Hope Farm has arranged to supply a Thoroughbred horse, an Aberdeen-Angus bull and a Jersey bull in 1929, for the use of Grove Place.

The Hope Farm continues to prosper and is rapidly becoming a well-organised and equipped tropical dairy farm. For the financial year, the accounts show a profit of nearly £2,500. The new sanitary dairy building, locally known as The Cathedral, is now being completed. This will provide for milking 60 cows with electric milking machines, electric lighting and individual watering bowls for the cows.

The Cuttabung Spring, in th Mango Walk, has been piped down to the site and a water tower to hold 20,000 gallons of water is being constructed for the water-supply.

An experimental trial of an American "Manure-Spreader", drawn by a pair of steers, has been a complete success and this is now in daily use. One beneficial result of the daily removal and spreading of the manure from the various yards has been an almost complete suppression of the flies that were formerly very troublesome.

Two fine Stud bulls of the Holstein and Red Poll breed have recently been imported and a Guernsey of distingushed lineage is expected shortly.

After remaining free from tuberculosis for 15 years, this disease unfortunately gained an entry into the Hope herd, through an imported Jersey bull with a Federal tuberculin test. The whole herd has been repeatedly tested and all reactors were promptly slaughtered. The herd is now again free from this disease, but the sacrifice of stock was over £700 in value.

This experience has shown the great diagnostic value of the intradermal tuberculin test which can be confidently recommended for use on pen cattle in Jamaica.

Agricultural Education.

The Farm School has been enlarged to a capacity of 60 students in residence. At Xmas there were 25 vacancies for which 45 applications were received. The Headmaster's report shows that the Farm School has thoroughly justified its existence by the large number of young men trained at the Farm School who are now assisting to develop the agriculture of the colony in various capacities. Our thanks are due to the Government and the Legislative Council for their recent action in bringing the utility of the Farm School before the people of Jamaica and for the generous provision that has been recently made for the enlargement of its buildings.

The Headquarters at Hope has also solid reasons for gratitude for recent benefits received. The whole establishment is now equipped with modern sanitation and electric lighting. The tarred roadways through the Gardens have been an immense improvement and have greatly encouraged the visits of motorists.

The enlargement of the Head Office has been a great boon to the administrative branch of the Department.

Horticulture.

The collection of orchids which 6 years ago had been reduced to a very slender array has now been built up by annual importations to such a standard that at least 40 to 60 orchid blooms are to be seen in the New Orchid House every day in the year.

The Horticulturist values his orchids at over £1,000 on a commercial basis of assessment. Seedlings by the asymbiotic process have been successfully raised by the Microbiologist and some very interesting hybrids which are new to Horticulture, are now being raised at Hope. These include crosses of the local Broughtonia Sanguinea, with Lælio-Cattleya hybrids, and Brasso-Cattleya also crosses of Sophrinitis hybrids on Brasso-Cattleya (potinara).

A fine new hybrid Bougainvillea has been named "Lady Stubbs" by the gracious permisssion of the wife of His Excellency. This is a pure rose-pink of strong growth, free flowering with very large bracts and easy of propagation. It is hoped that this will adorn many gardens in Jamaica when plants become available for distribution.

II.—PUBLIC GARDENS.

Report of the Superintendent and Horticulturist.

I. Hope Gardens.

Cannas.—During 1927, a collection of twelve varieties of Cannas was imported from Henry Dreer, Philadelphia. Of these the following varieties have been retained for further trial:—Lyon Rouge, Gertrude, Copper Giant, Louis Cayeux, Triomphe, Poppy and Dazzler. Much difficulty has been experienced in bringing the plants to perfection, owing to a fungus and a maggot attacking the flowers at a very early stage. A certain amount of success has been obtained in checking the ravages of these pests by the frequent use of Bordeaux Mixture and Calcium Cyanide dust before the flowers develop. It is observed that Cannas grown in the Kingston Public Gardens are not affected. The varieties grown at Hope which give most resistance to these pests are Hungaria, Nokomis, King Midas and President.

The following is a list of the collection of Cannas grown:—

Name.	Description.
1. King Humbert	Flowers bright red, leaves bronze.
2. Wyoming	" orange, " "
3. Prince of Orange	" light red, " green
4. Solfatara	" deep red, " "
5. Venus	" yellow, " "
6. Hungaria	" rose pink, " "
7. Orange Bedder	" golden, " "
8. Ambassador	" cheery red, " bronze
9. Aviation	" vermilion, " green
10. Sheherazade	" rose, " "
11. Nokomis	" crimson, " bronze
12. Eureka	" white, " green
13. President	" scarlet, " "
14. Yellow King Humbert	" yellow with red spots, leaves green

Orchids.—Further additions were made to the orchid collection during the year under review. Three consignments of Cattleyas were received from Mr. A. E. Lawrance, Caracas, Venezuela, comprising 100 plants of Cattleya Mossiæ and 100 plants of Cattleya Luedemanniana. These arrived in good condition. Twenty very choice varieties of Brassocattleya and Brassolaeliocattleya were obtained from Messrs. H. G. Alexander, Ltd., Westonbirt, Tetbury, Glos., England.

The Hope Orchid Collection has steadily increased during the last six years. In 1923, the collection was comprised of only a small miscellaneous group of families but has now reached such proportions, as to provide a continual show of bloom throughout the year in the Orchid House, averaging between 60 and 100 blooms at all times of the year.

Among the plants which flowered during the year were several excellent varieties of Brassocattleya, viz.: B. C. Olympus, Pallas, and Mrs. J. Leeman (St. Alban's variety), while among the Cattleyas, were to be seen some very attractive varieties, one of which was Cattleya Hardyanna var. regalis, with ten beautiful blooms.

The following list shows approximately the present number of plants and families comprising the collection:—

1.	Aerides	300
2.	Angraecum	6
3.	Bletia	12
4.	Brassia	12
5.	Brassocattleya	30
6.	Brassolæliocattleya	9
7.	Broughtonia	20
8.	Catasetum	1
9.	Cattleya	400
10.	Coelogyne	12
11.	Cypripedium	10
12.	Dendrobium	100
13.	Epidendrum	25
14.	Gongora	12
15.	Laelia	20
16.	Laeliocattleya	100
17.	Oncidium	20
18.	Phaius	12
19.	Phalænopsis	9
20.	Platyclinis	1
21.	Renanthera	12
22.	Rhynchostylis	2
23.	Rodriquezia	1
24.	Saccolabium	4
25.	Schomburgkia	6
26.	Sobralia	10
27.	Sophrolaeliocattleya	8
28.	Stanhopea	30
29.	Thunia	3
30.	Vanda	50
		1,237

Choice species and hybrids have been successfully cross-fertilized and an effort is being made to raise seeds on prepared media. Of outstanding interest among the number of successful crosses, are two that have been obtained between Broughtonia sanguinea and Lc. Hon. Mrs. Astor and between Broughtonia sanguinea, and Bc. Mrs. J. Leeman. Should these two unique crosses between dissimilar families prove successful, very interesting results may be hoped for.

If one may judge by the apparent pleasure so often expressed by visitors to the Gardens, we are confident that the orchid collection provides more joy both to the resident public and to visitors to the Island, than any other collection of plants that may be grown in a Public Garden.

Plant House.—A Plant House was erected during the year; mainly for the purpose of exhibiting the orchids when they are in bloom. The dimensions of the house are 60 feet long by 15 feet wide, with a 5 feet walk running through the centre. The interior is laid out in the form of a water garden. Around the tanks which extend to the length of the house on both sides is planted a variety of ornamental plants. The orchids are suspended on small iron bars which run through the rafters. It has been observed that plants which made very unsatisfactory growth in the old plant house are now making very fine specimen plants in the new house.

General.—The piece of land adjoining the nursery on which a compost heap was kept has now been cleared and levelled off and the foreground has been laid out in lawn while the back portion has been planted with miscellaneous succulent plants.

Concrete curbs were constructed in the nursery for holding the plants in bamboo pots which are kept in stock for sale. This has improved the lay-out of the nursery.

Owing to the prolonged drought experienced during the first half of the year, the Garden Sales did not come up to expectation, but in view of this setback compare favourably with past years.

The coffee seedlings received a severe check in growth during the drought and were not sufficiently grown to be sent out during the fall of the year.

A plant of *Taraktogenos Kurzii* was presented to the Department by the Royal Botanic Gardens, Kew, in 1924. This was planted at Hope Gardens, but has made very unsatisfactory growth. During the drought of 1928, when very little water was available, the plant gave the impression that it is not suitable for cultivation in dry areas.

An effort is being made to distribute during the autumn of 1929, a large number of timber seedlings for re-afforestation.

PLANTS DISTRIBUTED FROM HOPE GARDENS, 1928.

Sold.

Economic Plants:—	
Coffee	41,925
Cacao	1,967
Citrus—Seedlings	44,058
Citrus—Budded Plants	1,276
Mango—Grafted Plants	721
Miscellaneous	2,801
	92,748
Ornamental Plants	27,990
	120,738

Free Grants.

Economic Plants:—	
Coffee	48
Cacao	18
Citrus—Seedlings	38
Cane Tops and Cuttings	206,633
Elephant Grass Cuttings	13,304
Timber Trees	2,229
Miscellaneous	92
	222,362
Ornamental Plants	2,170
	224,532
Total number of Economic Plants	315,110
Total number of Ornamental Plants	30,160
Total number of Plants distributed	345,270

The following statement shows the distribution of plants for the last three years from the Nursery at Hope:—

	1928.	1927.	1926.
Coffee	41,973	58,908	96,228
Cacao	1,985	852	223
Citrus—Seedlings	44,096	44,472	51,607
Citrus—Budded Plants	1,276		
Mango—Grafted Plants	721	*	*
Nutmeg	* ..	203	311
Eucalyptus	* ..	37	308
Cane Tops and Cuttings	206,633	191,960	156,194
Elephant Grass Cuttings	13,304	17,300	67,989
Timber Trees	2,229	10,431	8,593
Miscellaneous Fruit and Economic Plants ..	2,893		
Ornamental Plants	30,160	27,074	29,967
	345,270	351,238	411,720

2. CASTLETON GARDENS.

During the year the pathway through the propagating Nursery was continued through the Cacao Grove to connect up with the pathway leading to the river.

The Mangosteen trees produced a good crop of fruit this year. Several of the trees planted on the hill side will soon come into bearing.

Six plants of the Pejibaye Palm (*Guilielma utilis*) the fruit of which is edible were raised from seed presented by Lady Swettenham and were planted near the Lily Tank.

The *Amherstia nobilis* trees in the Garden flowered very freely and the racemes with their beautiful orange and red flowers were an attractive feature for many months.

*Included in Miscellaneous Fruit and Economic Plants.

The Castleton Gardens are a great centre of attraction both from the botanical interest and from the pleasure it affords to picnic parties. The accommodations provided by the Jamaica Tourist Association in the way of Tea House, Dressing House for bathing parties and Public Conveniences have added considerably to the comforts of the visitors to the Gardens.

During November, 31.67 inches of rain was registered at Castleton, and these heavy rains caused considerable damage to the pathways, and necessitated their being re-gravelled.

The usual routine work of billing lawns, pruning shrubs, opening flood drains, forking and weeding beds, and propagating plants was regularly attended to and the Gardens kept in good order.

PLANTS DISTRIBUTED FROM CASTLETON GARDENS.

Sold.

Economic Plants	98
Ornamental Plants	912
	1,010

Transferred to Hope.

Economic Plants	2,958
Ornamental Plants	20,992
	23,950
Total number of Economic Plants	3,056
Total number of Ornamental Plants	21,904
Total number of Plants distributed	24,960

3. PUBLIC GARDENS, KINGSTON.

The long shrubbery to the east of the Gardens was cleared and laid out in lawn and Canna beds.

The large collection of Cannas grown in the Park gave a constant display of colour during the year. The Cannas do exceptionally well owing to the absence of the fungus and maggot which are so prevalent in the flowers before they are fully developed at Hope Gardens. The success obtained with Cannas in Kingston is probably due to the dry atmosphere and even temperature existing throughout the year.

Law 17 of 1928, was made to allow the Kingston and St. Andrew Corporation to construct a roadway through the Victoria Park to connect up Upper and Lower King Street. This roadway was completed by the end of the year. Several ornamental trees had to be destroyed to allow for the construction of the new road among which were some fine specimens of *Poinciana regia, Cassia fistula, Casuarina equisetifolia* and Palms.

The Jamaica Military Band gave a number of concerts in the Park which were very much appreciated by the Public.

The general routine of maintaining the Gardens was regularly attended to.

The vote for the maintenance of the Kingston Public Gardens was increased to provide extra equipment and labour for the proper maintenance of the lawns around the Public Buildings. Two 'Willing Worker' Mowing Machines were imported for this purpose and are giving good service.

The Gardens around Headquarter House are now being maintained by the Department.

4. HILL GARDENS, CINCHONA.

Messrs. Vilmorin Andrieux & Cie, Paris, presented the Gardens with a large collection of Gladiolus bulbs in exchange for seeds supplied from the various Gardens. Bulbs of Gladiolus *Primulinus Primadonna* were presented to the Gardens by Mr. William Eden Clarke, Sunnymede, Mass., U. S. A., for trial at the Hill Gardens. These bulbs made good growth and flowered freely during the season.

The Cinchona Plantation provides large quantities of Peat and Moss for the requirements of the Hope Gardens Nursery and at the Christmas Season a good number of Pines and other suitable trees are supplied to meet the demand for Xmas Trees.

The Gardens were frequently used both by people residing in the hills and those who go to the hills during the summer months.

5. KING'S HOUSE GARDENS.

It was decided to do away with the rose garden as an ornamental feature, and, in place of roses, Cannas are now planted.

The Lily Tank was emptied and cleaned out and a vareity of day and night blooming Nymphaeas planted in the Tank.

The pastures around King's House were cleaned during the year. Permission was given to Mrs. Crooks and Mr. H. W. Bolton to use the Race Course and East pastures for grazing, on condition that the parties concerned maintained the pastures in good condition.

General repairs were done to the Greenhouse.

The general routine work of mowing lawns, weeding and pruning shrubberies, and house decoration was regularly attended to by the Garden Staff.

6. Gordon Town Garden.

The small enclosed Garden in Gordon Town was maintained in good condition by a gardener sent from Hope Gardens.

7. Bath Garden and Nursery (St. Thomas).

Mr. R. Glen Campbell, Inspector of Plant Diseases, who is in charge of this Garden reports as follows:—

The cane nursery has been discarded as little use has been made of it, and a citrus nursery established, and there are now growing over 2,000 sour orange seedlings for budding purposes. The usual routine work of this garden was regularly carried out and a neat appearance was maintained during the year.

8. Summary of Plants Distributed by the Department during the las Three Years.

	1928.	1927.	1926.
Coffee	41,973	59,858	96,228
Cacao	1,985	853	223
Citrus—Seedlings	44,096	46,022	51,607
Citrus—Budded Plants	1,276	*	
Mango—Grafted Plants	721	*	*
Nutmeg	*	203	611
Eucalyptus	*	37	308
Cane Tops and Cuttings	206,633	195,175	161,020
Elephant Grass Cuttings	13,304	17,300	67,989
Timber Trees	2,229	10,812	8,960
Miscellaneous Fruit and Economic Plants	2,991		
Ornamental Plants	31,072	28,061	30,885
	346,280	360,321	417,831

9. The Garden and Plantation Sales for the past three years have been as follows:—

	£	s.	d.
1928	780	10	0
1927	828	6	10
1926	698	6	11

10. The Rainfall at the various Gardens for the year under review is as follows:—

1928.	Hope Gardens.	Castleton Gardens.	Public Gardens Kingston.	Hill Gardens Cinchona.	King's House Gardens.
	Ins.	Ins.	Ins.	Ins.	Ins.
January	0.07	6.52	0.00	3.27	0.00
February	0.33	2.13	0.18	1.28	0.00
March	0.20	2.21	0.00	1.11	0.45
April	1.78	6.14	0.99	3.11	1.70
May	6.31	11.41	5.14	11.55	1.95
June	1.22	2.27	1.30	1.65	1.00
July	0.72	3.56	0.34	1.56	0.00
August	16.07	11.15	12.88	15.81	6.50
September	5.12	11.82	4.19	8.99	6.21
October	5.20	13.37	6.14	10.00	4.50
November	7.63	31.67	3.74	23.81	5.50
December	1.27	5.17	0.29	3.14	2.05
	45.92	107.42	35.49	85.28	29.85

11. Contributions to the Gardens have been received from the following:—

Foreign.

Plant Introduction Gardens, Summit, Canal Zone.
Messrs. Vilmorin-Andrieux & Cie., Paris, France.
Inspector General of Forests, Canberra, Australia.
Department of Agriculture, Ceylon.
Messrs. Reasoner Bros., Royal Palm Nurseries, Florida.
U. S. Department of Agriculture.
Conservator of Forests, Belize, British Honduras.
William Edwin Clark, Sunnymede, Mass., U.S.A.
Prof. Juan Balme, F.R.H.S., Mexico City, Mexico.
A. N. Lindsay, Michigan, U.S.A.
W. A. Schipp, Botanist, Tjondong Estates, Java.
Turkestan Plant Breeding Station, Tashkeht, U.S.S.R.
Department of Agriculture, Dar Es Salaam, Tanganyika.

*Included in Miscellaneous Fruit and Economic Plants.

Local.

Mrs. M. Malcolm, Knockalva, Ramble P.O.
Lady Swettenham, Belle Vue, Gordon Town.
Jamaica Agricultural Society, Kingston.
W. Cradwick, Mandeville.
E. A. Montgomery Stewart, Spanish Town.
Dr. G. Machado, Kingston.
A. Pullar, Kingston.

M. S. Goodman,
Superintendent of Public Gardens.

E. Downes,
Horticulturist.

III.—AGRICULTURAL EXPERIMENTS.

Report of the Acting Superintendent of Agriculture.

The year 1928 will long be remembered by planters as one during the first half of which one of the severest droughts for many years was experienced. It was not until August that rains set in and kept up to the end of the year. Owing to the good season which prevailed from August to the end of the year under review, and the better methods of mechanical cultivation practised in some of the sugar-cane areas together with the increased planting and yield of the better sugar-cane varieties such as Ba. 11569 and B.H. 10 (12) the output of sugar for the coming season will be approximately the same as this year although an appreciable area of the best cane lands has been planted in banana.

Mosaic Disease.—The year has been marked by more determined efforts to eradicate Mosaic Disease from the sugar-cane areas than has hitherto been the case. Every succeeding year shows a more determined effort to reduce the infection and it is very gratifying to report that the infection in plant canes is almost nil. The planters have been carrying out the advice given to them by the Department of Agriculture and are also themselves making careful observations and have come to the conclusion by carefully watching results that the infection in the fall planting is considerably less than in planting done during the spring. Sufficient care is still not given to rogueing the ratoons and the second ratoons are generally so very heavily infected that the fields have to be replanted. The Uba cane has been a most valuable asset in this respect, in that where heavy infection prevailed it has been possible to replant the field or area with Uba, and so reduce the area of actual infected cane on the estate, and at the same time eliminate the heavily infected area which allowed of concentration of effort on the less infected and smaller area of cultivation remaining.

There have been requests from planters for the better varieties of sugar-cane that are highly resistant or tolerant to Mosaic Disease to assist them in their effort to reduce the infection in their fields to a negligible quantity.

In several cane areas there has been a marked increase in root disease owing to the severe drought which weakened the resistance of the cane to effects of this disease.

Canes.—Several estates which were obliged during the earlier period of the outbreak of Mosaic Disease to plant Uba cane to assist in the control of this disease and where it was impossible to grow any other cane than Uba are now planting the P.O.J. 2725 owing to its high resistance to the disease. Estates on which the infection was not so high but planted Uba to assist them to concentrate their effort on a smaller area of the better susceptible varieties have reduced their infection to such a negligible quantity that they are discarding Uba altogether and planting such varieties as Ba. 11569, B.H. 10 (12) and S.C. 12/4.

It is remarkable to note that on the estates on which mechanical cultivation is done with the Fowler Plough, and where the method of knifing the soil instead of turning it with the Mould Bored Plough has been used, there has been a considerable increase in the tonnage per acre, and in some instances the increased tonnage per acre for B.H. 10 (12) and Ba. 11569 over the White Transparent in these areas has been from 40 to 50 per cent. per acre and sometimes 100 per cent. The Ba. 11569 has given so far much better results with this cultivation in heavy clay soils than the B.H. 10 (12) which is not adapted to these soils. The Ba. 11569 has averaged, as plant canes, on large areas on some estates over 50 tons per acre and it is not infrequent to hear of individual fields yielding 60 and 65 tons and over per acre. At Moneymusk a 17-acre field was divided in half, one half planted with White Transparent and the other half with Ba. 11569. The White Transparent gave 30.5 tons per acre and the Ba. 11569 gave 60 tons per acre or approximately a 100 per cent. better yield per acre. It is to be regretted that this cane is very susceptible to Mosaic Disease, and cannot be grown in certain areas which are very suitable for it owing to the prevalence of Mosaic Disease and where Uba only can be successfully grown.

Experiments.—Manurial experiments were laid out and reaped during the year on the following estates—Cambridge, Trelawny; Hillside, Vere; Morelands, Vere; and Experiment Station, Hope; and experiments were laid out at Cambridge, Trelawny; and Kew, Hanover, to be reaped during 1929. On reference to Table I., Cambridge Estate, Ratoon Canes, it will be observed that the only plots that gave a monetary return were the two plots that received Nitrogen only in the form of Sulphate of Ammonia, and Nitrate of Soda at the rate of 2 cwt. per acre. Several other plots gave increased yields per acre over the No Manure Plot, but after deducting the cost of the fertilizers, there was a monetary loss.

Table II. Hillside, Plant Canes. It will be seen that there was a monetary gain on the plots which received Nitrogen in the form of Sulphate of Ammonia and Ammo-Phos. at the rate of 2 and 2½ cwt. per acre respectively, and a monetary gain of 26/- and 18/- per acre. Plot 7 which received 2 cwt. Sulphate of Ammonia and 1 cwt. Sulphate of Potash gave an increase of 5.12 tons per acre over the No Manure Plot, gain of 27/- after deducting the cost of the manures. There was a monetary loss on all the other plots that received fertilizers.

Table III. Morelands, Plant Canes, B.H. 10 (12). It will be seen on reference to the above Table that all the plots which received fertilizers gave an increased yield over the No Manure Plots, except the Plot which received a complete fertilizer. In this series there were two plots to which Sulphate of Ammonia was applied at the rate of 2½ cwt. and 2 cwt. per acre, and gave increased yields over the No Manure Plot of 5 tons, and 18.25 tons per acre respectively, a monetary gain of 32/6 and 225/6 after deducting the cost of the fertilizers, or an average of 129/- per acre. The Ammo-Phos. plot which received 2½ cwt. per acre, gave an increased yield of 12.7 tons per acre over the No Manure Plot or a monetary gain of 136/7 after deducting the cost of the fertilizer. The next largest monetary return was on the plot to which 2 cwt. Sulphate of Ammonia and 1 cwt. Sulphate of Potash per acre were applied. The increase was 11.75 tons per acre, equal to 119/9. The plot, strange to say, which received lime at the rate of 1 ton per acre gave an increase of only 1.25 tons per acre and after deducting the cost of the lime there was a loss of 2/6 per acre.

Table IV. Experiment Station, Hope. This experiment was with Sulphate of Ammonia and Ammo-Phos. in duplicate on Uba cane ratoon at the rate of 2½ cwt. per acre and it will be seen on reference to the above Table, that while the Sulphate of Ammonia gave increased monetary gains of 125/- and 68/- per acre or an average of 96/6 per acre on the two plots the Ammo—Phos. gave a monetary gain of 110/- per acre on one plot and a loss of 4/- per acre on the other.

M. S. Goodman,
Acting Superintendent of Agriculture.

Table I.

Estate—Cambridge. *Field—Big Line, Ratoon Canes.*

Plot.	Description.	Per Acre. Sulphate of Ammonia.	Nitrate of Soda.	Sulphate of Potash.	Super Phos.	Lime.	Cost.	Tons Cane.	Increase.	Profit or Loss.
		cwt.	cwt.	cwt.	cwt.					
1	Control ..	..	..	..	..	..	..	16.00		
2	Nitrogen ..	2	..	..	..	..	30/-	21.10	+4.65	+35/-
3	do. ..	..	2	..	..	..	34/6	19.10	+2.65	+2/6
4	Control ..	..	..	..	..	..	..	16.90		
5	Nitrogen and Potash	1½	..	1	..	..	37/3	20.50	+1.85	−11/5
6	do. do. ..	..	1½	1	..	..	40/7	19.90	+1.25	−23/1
7	Control ..	..	..	..	..	..	..	20.40		
8	Nitrogen, Potash, Phosphate ..	1½	..	1	1	..	43/9	19.50	−0.25	
9	Nitrogen, Potash, Phosphate ..	..	1½	1	1	..	47/1	21.90	+2.15	−17/1
10	Control ..	..	..	..	..	..		19.10		
11	Nitrogen and Potash	2	..	1	..	..	44/9	21.00	+2.95	− 3/5
12	do. ..	..	2	1	..	..	49/3	20.40	+2.35	−16/5
13	Control ..	..	..	..	..	..	..	17.00		
14	Complete ..	1	1	1	1	..	53/6	19.10	+2.05	−24/10
15	Lime ..	..	..	..	..	1 ton	..	17.00	−0.05	
16	Control ..	..	..	..	..	..	..	17.10		

TABLE II.

Estate—Hillside, Vere. *Field—Bottom Pasture, Plant Canes.*

Plot.	Description.	Per Acre. Sulphate of Ammonia.	Nitrate of Soda.	Super Phos.	Sulphate of Potash.	Ammo-Phos.	Cost.	Tons Cane.	Increase.	Profit or Loss.
		cwt.	cwt.	cwt.	cwt.	cwt.			tons.	
1	Nitrogen ..	2	..	..	..	..	30/-	31.50	+4	+26/-
2	do. ..	..	2	..	..	..	34/6	28.75	+1.25	
3	No Manure ..	..	..	..	..	..	..	27.50		
4	Nitrogen and Phos. ..	2	..	1	..	..	36/6	29.62	+2.12	
5	Ammo-Phos ..	..	..	..	..	2½	41/6	31.75	+4.25	+18/-
6	No Manure ..	..	..	..	..	..	..	27.50		
7	Nitrogen and Potash	2	..	..	1	..	44/9	32.62	+5.12	+27/-
8	do. ..	..	2	..	1	..	49/3	31.87	+1.50	
9	No manure ..	..	..	..	..	..	..	30.37		
10	Phosphate ..	..	..	2	..	..	13/-	28.62	−1.75	
11	Potash ..	..	..	..	2	..	29/6	27.62	−0.38	
12	No Manure ..	..	..	..	..	..	..	28.00		
13	Nitrogen, Phosphate and Potash ..	2	..	1	1	..	51/3	26.85	−1.15	
14	do. ..	..	2	1	1	..	55/9	29.50	+1.25	
15	No Manure ..	..	..	..	..	..	..	28.25		
16	Complete ..	1	1	1	1	..	53/6	23.87	−4.38	

TABLE III,

Estate—Morelands. *Field No. 2, Pasture—Plant Canes*

Plot.	Description.	Per Acre. Sulphate of Ammonia.	Ammo-Phos.	Nitrate of Soda.	Sulphate of Potash.	Super Phos.	Lime.	Cost.	Tons Cane.	Increase.	Profit or loss.
		cwt.	cwt.	cwt.	cwt.	cwt.	ton.			tons.	
1	Control ..	..	..	..	..	..	..	..	45.00		
2	Nitrogen ..	2½	..	..	..	..	..	37/6	54.00	+5.00	+32/6
3	Nitrogen and Phos.	..	2½	..	..	..	..	41/5	61.70	+12.70	+136/7
4	Control ..	..	..	..	..	..	..	..	53.00		
5	Nitrogen ..	2	..	..	..	..	..	30/-	68.50	+18.25	+225/6
6	do. ..	..	..	2	..	..	..	34/6	59.00	+8.75	+88/-
7	Control ..	..	..	..	..	..	..	..	47.50		
8	Phosphates ..	..	..	..	..	2	..	13/-	53.00	+5.00	+57/-
9	Potash ..	..	..	..	2	..	..	29/6	54.00	+6.00	+54/6
10	Control ..	..	..	..	..	..	..	..	48.50		
11	Nitrogen and Potash	2	..	..	1	..	..	44/9	61.00	+11.75	+119/9
12	do. ..	..	..	2	1	..	..	49/6	57.00	+7.75	+59/-
13	Control ..	..	..	..	..	..	..	..	50.00		
14	Nitrogen and Phosphate ..	2	..	..	..	2	..	43/-	57.00	+7.75	+65/6
15	do. ..	..	..	2	..	2	..	47/6	51.00	+1.75	−23/-
16	Control ..	..	..	..	..	..	..	..	48.50		
17	Nitrogen, Phos., Potash ..	1	..	1	1	2	..	60/-	44.50	−5.75	
18	Lime ..	..	..	..	..	..	1	20/-	51.50	+1.25	−2/6
19	Control ..	..	..	..	..	..	..	..	52.00		

TABLE IV.

Estate—Experiment Station, Hope. *Field—Ratoons, Uba Cane.*

Plot.	Description.	Per Acre.					
		Sulp. of Ammonia.	Ammo-Phos.	Cost.	Tons Cane.	Increase.	Profit or Loss.
		cwt.	cwt.				
1	Nitrogen ..	2½	..	37/6	35.85	+11.63	+125/3
2	No Manure ..	..	..	..	24.22		
3	Nitrogen ..	..	2½	41/5	35.04	+10.82	+110/10
4	Nitrogen ..	2½	..	37/6	30.27	+ 7.58	+68/4
5	No Manure ..	..	..	..	22.69		
6	Nitrogen ..	..	2½	41/5	25.34	+ 2.65	−4/8

EXPERIMENT STATION.

Report of the Plant Breeder.

Canes.—During the year under review one of the severest droughts for many years was experienced. During the dry period the canes in the Experiment Station suffered badly as very little and at times no water was available for irrigation.

After the rains started in August, there was a general demand for cane tops and cuttings, and a total of 206,633 was distributed or more than during the previous year.

This year, as in the previous one, there was not much demand for Uba cuttings, preference being given to those varieties of good 'purity' and large tonnage, owing to the decrease in the fields of Mosaic Disease. Where the disease is still prevalent there has been a large demand for the better P.O.J. varieties. The following is a list of the varieties and quantities of each distributed:

B.H. 10 (12)	54,519
Ba. 11569	28,318
Uba	27,260
B. 1529	21,899
P.O.J. 2725	14,696
S.C. 12/4	10,053
P.O.J. 2727	9,562
White Transparent	7,698
Badila	3,913
P.O.J. 324	3,162
P.O.J. 2714	3,250
Mexican Striped	3,100
J. 72	2,575
B.S.F. 12 (50)	2,275
B. 268	1,950
P.O.J. 2379	1,400
B. S. F. 12/48	1,300
H. 109	1,056
B. 417	1,000
B. 7169	812
B. 295	750
Ba. 11403	700
C. H. 64/21	700
Ba. 7924	700
P.O.J. 826	600
P.O.J. 979	550
Ba. 8409	660
Miscellaneous Varieties	2,175
	206,633

The P.O.J. 2725 was in great demand and 10,000 cuttings were distributed. The orders could not be supplied in full but we hope this year to be able to meet all demands in full. This cane is one of the most promising of the P.O.J. varieties. It is a stout cane with a very good purity and is practically immune to Mosaic Disease, this being one of its best points. From the small quantity of ratoons which we have much cannot be said with regard to its ratooning qualities, but it appears as if it will ratoon well in the light soils with an adequate supply of water.

The P.O.J. 2725 which is a free-arrowing variety starts to arrow in October, and owing to the early and profuse arrowing habit this cane matures early and should be reaped in December or January, when the maximum results will be obtained. It also affords the ratoons a longer period of growth before the next flowering season. This cane should be planted between August and September, so that it will have a years' growth before flowering.

The P.O.J. 2727 is not a free-arrowing variety and matures much later than the P.O.J. 2725. This variety is not immune to Mosaic Disease but is tolerant and does not suffer from the attack of Mosaic. From observations during the prolonged drought this cane stood up to the drought better than any of the other varieties in the Station.

P.O.J. 2714 is a stout cane of good promise but apparently does not stool as vigorously as the above varieties. It also promises to be of good ratooning qualities.

The other P.O.J. varieties are small canes and not immune to Mosaic Disease. The best of these are P.O.J. 213 and 234 but the purity of the juice of these two varieties is not as good as in either P.O.J. 2725 or 2727.

It is very pleasing to note that several good nurseries of P.O.J. 2725 and P.O.J. 2727 have been started on estates to supply cuttings for planting during 1929, and these nurseries are very promising.

An effort would have been made to cross P.O.J. 2725 with other good varieties such as B.H. 10 (12), S.C. 12/4 and Ba. 11569 but owing to its very early arrowing no arrows of these other varieties were available at the time and it appears that such crossing will not be possible owing to the varieties arrowing at different times.

B.H. 10 (12) still continues to do well on the rich light soil with an adequate supply of water and the purity of the juice excels all other varieties.

Ba. 11569 has given excellent results on the heavy clay soils and has increased the yields in these soils by more than 20 per cent.

There has been a great demand for cuttings of B.H. 10 (12) and Ba. 11569 and these varieties are being planted extensively on the estates.

H. 109 has not been the success which had been looked for and has been rather disappointing to planters who expected that it would almost double their tonnage. On one estate where the soil is light and is irrigated this cane shows promise of producing a good tonnage but these conditions are very limited.

Several old fields in the Experiment Station have been ploughed and planted with the newer and better varieties and those which are most in demand.

Banana.—The new section of bananas comprising Gros Michel, Robusta, Pink Gros Michel, China and Lacatan, were adversely affected by the prolonged drought. Very little water was available for irrigation and consequently growth was retarded. The Robusta has shown the best development and many of these have fruited during the year, giving large bunches. Trapping for borers was continued during the year, and by this method the pest has been kept under control.

Mangoes.—Budding of Mango trees continued during the year and general cleaning of the young budded trees. Some of the trees in the Experiment Station suffered from thrips and these were sprayed with success with a tobacco decoction. Only a moderate crop of mangoes was reaped this year.

Cacao.—A fair crop was reaped. The harvesting, fermenting and curing were all carried out by the Farm Students. Special attention was given to pruning by the students.

Coffee.—The usual pruning was carried out and a fair crop reaped. An Estrella Pulper was purchased during the year and has given good results. The students were able to produce very good parchment coffee.

Citrus.—The trees were sprayed twice during the year with Lime Sulphur Wash against the Citrus Black Fly. Several thousand buds from the Marsh Seedless and Royal Grapefruit and Navel Orange were obtained for budding plants for sale.

School Garden.—The students of the Farm School continued to grow vegetables comprising tomatoes, cabbages, cassava (sweet and bitter), turnips, carrots, beet, and Irish potatoes. They also grew beds of pea-nuts and Virginia tobacco. From one quart of pea-nuts planted they reaped 42 quarts. Since these good results were obtained a number of the members of the Agricultural Society have decided to plant pea-nuts. Several members of the Agricultural Society were supplied with selected seed from the plot of Virginia tobacco.

Agricultural Education.—The Farm School Students continued to visit the Experiment Station for five days each week, and received instruction in the cultivation of all the crops mentioned above. Special attention was given to the budding and grafting of mangoes as also to the fermenting and curing of cacao and coffee.

Mr. L. A. Powell, the master in charge of the students in Practical Agriculture, has taken a keen interest in this part of his work.

W. S. Goodman,
Plant Breeder.

Hope, Kingston P.O.,
4th February, 1929.

IV.—DISEASES OF ANIMALS.

Report of Government Veterinary Surgeon.

Introduction.

Introduction.—From May 7th, and October 25th, (approximately 5½ months) I served as Acting Director of Agriculture, during vacation leave in England of the Director.

I was so fully occupied with the duties of my acting appointment that I had to curtail my work both in the Farm School and in the country parts.

2. Under the circumstances I have not devoted as much time as I planned to tick control work or experimental treatment of horses and mules for so-called farcy (Saccharomyces farciminosus)—epizootic lymphangitis.

3. As far as I have been able to determine there is a strong and general opinion in favour of tick suppression. On the other hand, many livestock owners adversely criticize some of the methods of procedure officially adopted.

Consequently and with the object of a better understanding or a clearing of the atmosphere, the provisions of "The Tick (Control and Eradication) Order, 1928," made 12th March, 1928, were submitted for criticism to the Board of Management of the Jamaica Agricultural Society and discussed in conference with the Penkeepers' Committee of the Jamaica Imperial Association, on 15th November.

From the opinions expressed, I conclude that, except for differences in minor matters of procedure, these two bodies realize the importance and value of tick suppression and endorse the policy and methods ordered by the Government for carrying out the work.

1. Government Farm School, Hope.

Except during the 5½ months of absence of the Director of Agriculture, when from necessity, I had to curtail my periods with the students about two-thirds, I have continued instruction in Veterinary Science at the School as scheduled—3 periods of two hours weekly, and in addition have always utilized occasions of veterinary work on the Farm as demonstrations for their benefit.

They have had opportunity, exclusive of less important matters, to observe such practices or conditions as:—

(i) Dehorning of calves and older cattle.
(ii) Castration of colts and mules, and the bloodless castration of young cattle by use of the "Emasculatome" (new instrument).
(iii) The intradermal and thermal methods of applying the tuberculin test.
(iv) Some types of dystokia.
(v) Methods for determination of pregnancy and causes of temporary or permanent sterility.
(vi) Treatment of retention of foetal membranes.
(vii) Causes and consequences of traumatic gastritis of ruminants.
(viii) Intravenous injections.
(ix) Administration of drenches and boluses, application of blisters, bandages, poultices, etc.
(x) Treatment of puncture wounds of the hoofs and the value of preventive injections of tetanus antitoxin.
(xi) The johnin test.
(xii) White sores in calves.
(xiii) Blackleg vaccination.
(xiv) Pneumonia and enteritis in calves.

At post mortem they have seen the lesions associated with:—general pyaemia of calves, different types of pneumonia, tuberculosis, the acute gastro-enteritis of metallic poisoning (lead carbonate), cystic kidneys and general induration of the female genital organs.

Throughout the year I always found the students very interested in this branch of their studies. Some readily grasp the significance of topics treated, others are disappointing.

2. Government Stock Farm, Hope.

(i) *Tuberculosis.*—As three separate intradermal tuberculin tests were conducted in 1927, on all the Farm cattle over 4 months of age, and all reactors thereby discovered were killed, it was considered sufficient if only one test were made in 1928. Accordingly between November 28th and December 8th, all the cattle other than those born in 1928, were tested by the intradermal method, i.e., 16 bulls, 14 working steers, 267 cows and heifers.

The tests resulted negatively in all animals, except one imported Angus bull, acquired from an Island pen just before the test. This animal, although of great breeding merit, was slaughtered within 14 days after the test, and disclosed old and arrested lesions.

The progress made within two years in the eradication of this disease from the Farm herd by means of the tuberculin test is very gratifying.

(ii) *Tick Fever* (*Piroplasmosis bigeminum*).—(a) No acute cases occurred either among the imported members of the herd or any of the native born. Systematic dipping as a preventive of tick infestation has been maintained with beneficial results.

(b) Chronic or mild intermittent cases of the fever, as indicated by unthriftiness (anaemia) or temperature readings, were treated, as in past years, with what is termed tonic injections of trypan blue (dose 1/3—½ of amount given per 100 lbs. in acute cases).

Cattle so treated, 1 bull, 23 cows.

(iii) *Parturition Record of the Cattle.*—Record:—Ninety four normal births, two still births and five aborted fœtuses. Of the ninety-four calves above, ten were lost during the year as follows:—

(a) Two were killed as unthrifty weaklings.
(b) Four from white sores (pyæmia).
(c) One from pneumo-enteritis.
(d) One from traumatic gastritis (rind of cane in the reticulum).
(e) Two heifer calves when 5-6 months old of lead poisoning (white lead carelessly left around premises by painters).

Pneumonia and enteritis were much less frequent this year because of improved system of feeding, better housing and general care, especially of the calves under 2½ months of age.

(iv) *Blackleg Vaccination* instituted in 1927, was repeated on all calves of susceptible age on 11th October—42 head were treated. No case of the disease occurred during the year. The malady has never appeared at Hope, but often Hope young cattle go to infected parts of the Island, hence it is considered an advisable procedure and of educational benefit to the students.

(v) *Wounds by penetrating objects such as nails or staples into the hoofs, stakes, thorns, etc.*—There has been the usual crop of these injuries, especially among the mules of the Gardens and Farm. All cases recovered and fortunately no sequel of tetanus resulted as so frequently happens when tetanus antitoxin is omitted. This result compared with previous years again illustrates the prophylactic value of tetanus antitoxin (even in small doses—500 units) when promptly given subcutaneously after wounds of this type.

The health of the mules in general has been good (only two cases of mild colic and three of parotiditis) apart from transitory lameness, and lacerations and traumatisms often inseparable from their conditions of work.

(vi) *Poultry.*—Their health has been good. Fowl cholera (hemorrhagic septicæmia of poultry) which in past years caused periodic losses of several hens especially did not occur during the year. This experience indicates the value of hemorrhagic aggressin as an immuning agent. The flock was treated with this agent in August, 1927, and again in the summer of 1928.

3. Grove Place Stud Farm.

(i) Seven visits were made to the Farm during the year.

(ii) *Mane Stock.*—During the year the livestock of this class consisted of:—

"Lembach"—Imported Thoroughbred Stallion
"Kentucky Boy"—Imported Ass
Twelve brood mares
Four fillies
Five 2 year mules
Seven mule cubs
Two jennies and one cub

"Lembach" maintained good health and condition as well as "Kentucky Boy," except for the keratomatous condition of his front hoofs which persists in spite of surgical treatment.

The brood mares in the dry season of the year showed an aggravation of mange infection (psoroptic mange). Accordingly more systematic and rigorous treatment was instituted. The results in most cases have been gratifying, but in others of long standing the condition, though temporarily improved, has persisted. Two such cases (incurables) are being destroyed and treatment continued. None of the mules and jennies have shown infestation.

Three mares were lost during the year:—

"Dimple" dying from emaciation, arising from intense mange infection.
"Prima Donna" and her mule cub from lightning stroke and
"Princess Mary" (a filly) from injury to her spine in the cattle crush.

(iii) *Cattle.*—(a) *Tuberculosis.*—No tuberculin test of the herd was made during the year, because no re-actors were discovered by the test of late 1926.

As a safeguard Jersey bull "Ethel's Pogis," when purchased from Trelawny and taken to the stud in January, was isolated and tested February 8th, with negative results.

(b) *Blackleg.*—Due to the occasional occurrence of this disease the practice of annual vaccination of the cattle of susceptible age, has been continued.

Generally speaking the animals have had a trying year. Due to the severe 7-8 months drought experienced until August, there was shortage of feed (also depleted by pasture fire covering about 100 acres), and in July the establishment was nearly out of water—only 3 feet in one tank with its associated difficulties of distribution.

4. Work and Assistance in the Country Parts of the Island.

Forty-five visits to points in the country were made, exclusive of calls at properties connected with Tick Inspections and visits to Grove Place. Of these six were investigations of suspected foot and mouth, eight of suspected anthrax, thirteen for tick fever, one of hog cholera, four for tuberculin tests, two for guango poisoning, one of suspected rabies in dogs (really meningeal distemper), one for hæmaturia of cattle, two for "farcy" (saccharomyces farciminosus), one for motality associated with molasses feeding, one for sterility of a Montgomery bull, one for urticaria of cattle and five for general departmental purposes.

(i) *Foot and Mouth Diseases.*—Six reports of suspected foot and mouth were received, two from St. Andrew, one from Trelawny, one from St. Mary, one from Westmoreland and one from St. James. Fortunately none of these cases proved to be genuine.

(ii) *Anthrax.*—Of the seven places reporting suspected anthrax, three had all the indications of poisoning by Jamaica nightshade (urichites), one proved to be blackleg, one arsenical poisoning, one was provisionally diagnosed as anthrax, but proved by laboratory test negative, and one was a trouble of non-specific nature in sheep. Accordingly no actual outbreak of this disease was officially noted during the year.

(iii) *Tick Fever (Piroplasmosis).*—There has been no general outbreak of this infection in an acute form. Often cattle, especially when severely infested with ticks, suffer without serious mortality from sub-acute or chronic forms of the disease with its attendant lack of thrift and growth.

The visits mentioned above were in connection with the acclimatization of imported animals and to a few properties where native born cattle have not exhibited the usual degree of immunity found in the majority of our pen cattle.

(iv) *Tuberculosis.*—As this disease is such a serious menace to sound animal husbandry and no systematic survey of its occurrence in the Island has as yet been possible, I take every opportunity that offers arising either from an owner's direct request or incidentally to test as many cattle as possibe. Accordingly I tested during the year besides Government animals at Hope, and Grove Place, 29 Grade Red Polls in a herd in Manchester (from which number exportations were to be made), six cattle more or less associated with the Hope herd and ten privately owned in St. Andrew and previously infected in 1927. All three groups but the last were negative to the test. The last disclosed two re-actors, which, when slaughtered by consent of owner, exhibited very evident lesions.

Summary of these tests:—

Groups.	Number.	Infected Groups.	No. Re-actors.
3	45	1	2

(v) *Hog Cholera or Swine Fever.*—No genuine outbreaks came to my notice during the year. One suspected occurrence in St. Andrew, was clearly cases indicative of malicious poisoning.

Many reports have been made of "hog sick," especially in St. Elizabeth and Manchester. Similar reports of previous years have always been found on study to be types of pneumonia arising from continued

exposure in the rainy season. In nearly every instance, there has been a rapid disappearance of the trouble with the termination of the wet season.

(vi) *Hæmaturia of Cattle.*—Fewer cases were reported to the Department than in 1926 and 27, but I fear that its incidence in affected localities is not less. A similar, if not indentical disease, is reported in several European countries. Students of conditions abroad find no specific organism or parasite incriminated and assign as cause undetermined elements in the pasture fodder, (plant ingredients which produce catarrh and later polypoid formations in the bladder with more or less kidney disturbance).

So far I have found no really curative treatment. Most cases are temporarily benefited by three injections after intervals of 5-7 days of 12-18 grains of tartar emetic (2 grs. in 10 c.c. of water).

(vii) *Blackleg.*—Due to the increasing use of appropriate vaccines, losses from this disease apparently are on the decrease. In some instances, owners seem unable to realize the difference between blackleg and anthrax.

Only one serious outbreak on an estate in St. Catherine, where from all accounts the disease had not previously occurred and vaccination had not been practised, came to my attention. It was successfully, though tardily, suppressed by vaccination and carcase cremation.

(viii) *Nightshade (Trichites).* This poisonous plant appears from actual field observation and correspondence received to be exacting an increasing toll of cattle. It is a frequent cause for reports of suspected anthrax.

When pastures in the drought months are depleted of grazing and cattle are in extremis for food, they browse more often than under normal conditions upon the remnants of grass protected by the nightshade vines. As the grass at that time is abundantly intermixed with the fallen, faded and dried leaves of the nightshade vines, cattle are particularly prone to ingest sufficient of the leaves to produce poisoning.

It is a general practice not to cut or dig out the nightshade of the pastures, as it is assumed that cattle will not eat the green plant. This may be so, because of the acrid taste of the fresh plant (the acrid properties are not so pronounced in the dry plant), but such policy leads to an ever increasing abundance of the plant in the cattle runs for it is a vigorous grower and prolific seeder. The problem can only be handled by digging out the vines (bulbs, roots and upper growth) and promptly burning or deeply burying them.

5. Tick Eradication and Control.

From February to April, intermittent visits of inspection of tanks and herds were carried out. Fifty properties only were visited—11 in Manchester, 16 in St. Catherine, 10 in Westmoreland, 5 in St. Ann, 8 in Clarendon.

Of 43 tanks inspected, 39 were in working order although several were more or less defective from cracks and leaks. Three were found abandoned with indications of having never been in operation since construction.

Since the Tick (Control and Eradication) Order, 1928, was made and published in Gazette of March 15, 1928, there has apparently been renewed action in dipping, for it is significant that since that date especially, the quantity of Paranaph and Arsenite of Soda distributed by the Department has materially increased.

From the limited inspections I was able to make, I concluded that generally speaking tick suppressive measures were not being maintained as systematically as in previous years. In fact that the fair prospects of the undertaking, as foreshadowed in the initiation of the campaign, were threatened with blight, but apparently the 1928 Order is having some effect, and, if this renewal of interest is fostered and delinquents prosecuted, the Island may yet secure the evident advantages of tick suppression, if not eradication. I trust that in the coming year this excellent agricultural project will be materially advanced.

6. Assistance in Education.

I contributed to the programme of:—

(i) The Conference for Agricultural Instructors at Hope, in January.

(ii) The School for Sanitary Inspectors in May, by lectures and demonstrations on Meat Inspection and Milk Hygiene.

7. Inspections of Animals for Exportation and Landing in the Island (Law 24, 1890).

(i) For Export:—

One proof ass for British Honduras, 8 bulls, 5 dairy cows, 4 heifers for Cuba.

(ii) For landing in the Island:—

One Hereford bull and heifer from Canada for Atlantic Fruit Co. Thirty six dogs—all from England—six intransit for Colombia, one for Guatemala.

8. The Protection from Diseases (Bees) Law, 1918.

As a "person" appointed under this Law, I have had no duties to perform during the year, except to advise upon the revocation of "The Protection from Diseases (Bees) (Foulbrood) Order, 1926, which was effected 31st March, 1928, and marked the termination of the quarantine and campaign for the eradication of American Foulbrood from the area of Kingston and St. Andrew.

The campaign started in July, 1926, immediately after discovery and report of the outbreak, was vigorously pushed for the 12 ensuing months ending June 30, 1927, and as a safeguard its quarantine restrictions were continued until 31st March, 1928—nine full months after the area ceased to show infection.

The result has been very gratifying in that no recurrence of the disease has been discovered or reported since 30th June, 1927—18 months.

S. Lockett, V.M.D.
Government Veterinary Surgeon.
4.2.1929.

V.—PLANT DISEASES AND PESTS.

Report of the Secretary of the Advisory Committee on the Banana Industry.

The membership during 1928, was:—Hon. J. H. McPhail, Hon. L. A. Isaacs, Hon. T. J. Cawley, F. A. Cory, Esq., J. Roy Johnson, Esq., G. J. Goble, Esq., P. Lindo, Esq., J. Barclay, Esq., O B.E., the Director of Agriculture (Chairman), the Entomologist, the Supervising Inspector and the Microbiologist (Secretary).

There were no additions to the membership during the year, but the deaths of Hon. L. A. Isaacs and C. C. Gowdey, B.Sc., Entomologist, are recorded with regret.

Two meetings were held during the period under review at one of which members had the opportunity of meeting the Inspectorate. A large proportion of the business was dealt with by means of circulated papers, sixty-seven of these being considered. As hitherto, the weekly and monthly summaries of Panama Disease work were regularly circulated.

Among the important matters considered at the meetings were recommendations to the Government concerning the export of banana suckers, and the growing of root crops between bananas.

The Committee approved of a series of large scale experiments being carried out by the Microbiologist on the effects of various sized quarantined plots on the spread of Panama Disease.

The official figures of cases of Panama Disease treated in 1928, are:—

Month.	Diseased Roots.	New Cases.	Recurrences.	Total Cases.
January ..	3,905	257	1,759	2,016
February ..	4,809	266	2,043	2,309
March ..	5,817	266	3,052	3,318
April ..	3,831	210	1,825	2,035
May ..	4,189	175	2,106	2,281
June ..	3,890	217	1,928	2,145
July ..	4,445	176	2,303	2,479
August ..	4,306	167	2,484	2,651
September ..	3,999	183	2,074	2,257
October ..	4,954	266	2,255	2,521
November ..	4,907	252	2,492	2,744
December ..	5,057	209	2,910	2,119
Total 1928 ..	54,109	2,644	27,231	29,875
Total 1927 ..	40,137	2,332	17,867	20,199
Total 1912-28 ..	147,631	10,311	65,924	76,235

F. E. V. Smith,
Microbiologist and Secretary to the Committee.

Plant Diseases in Jamaica in 1928.

Report of the Government Microbiologist.

The long drought has had a noticeable effect in inhibiting some diseases while others appeared more noticeably with the advent of rains. It has been increasingly evident that the Jamaican list of really serious diseases is remarkably small and that of these very few will not respond to treatment in the form of a higher type of cultivation.

Bananas.

Panama Disease.—(Fusarium Cubense, Sm.) The official return of cases treated is given in the Report of the Secretary of the Advisory Committee. The proportionate increase in the number of diseased plants was less than in recent years due to the prolonged drought which in most districts extended from November, 1927 to July and August, 1928. There was a slight increase in the proportion of the disease occurring outside Portland, though this parish was responsible for 69 per cent. of the total number of diseased plants.

Rainfall appears to have a very marked influence on the increase in the incidence of the disease, and an enquiry into the records of the disease in the Island indicates that while drought undoubtedly inhibits the exhibition of symptoms there is an immediate increase of the disease with the advent of rains. This immediate increase is not very excessive, but it is generally maintained for sometime and would appear to be connected with the less active condition of the plants during a dry period. On the other hand heavy or abnormal rains do not always produce an immediate large increase in the disease, but this generally shows very markedly in two to four months after their advent. It would therefore appear that drought merely inhibits exhibition of symptoms and to a lesser degree the incidence of new attacks whereas excessive rains produce new infections which take some weeks to show up. This obviously accounts for the large proportion of the disease which appears in the wetter parishes and districts and those drier places which are subject to flooding from rivers, and for the regularity with which the figures increase in such months as February and March after the normal autumnal seasons. It must also be a large contributing factor to the comparatively small amount of disease present in most parts of Jamaica compared with the much wetter Central American countries which have suffered so severely from Panama Disease.

A very noticeable feature in many places is the large increase in the disease in slightly affected fields after replanting. This increase, however, is generally not maintained in the ratoons, and careful experiments on the methods of replanting may help in this respect.

Other Banana Diseases.—Bonnygate Disease. (*Sphærostible Musarum, Ashby*) occurred occasionally but most frequently in river valleys. Leaf spots and fruit spotting (Cercospora Spp.) were mostly restricted to a few areas only.

A single case of mottled foliage occurring in a fourth ratoon field was at first suspected of being "Bunchy Top"; further investigations showed no other symptoms of the disease and microscopical examination negatived the presence of the disease. The 'eyes' of the plant were grown under careful quarantine and although the leaf symptoms were perpetuated no signs of 'bunching' of the tops appeared It appears that the plant was a variegated form of Gros Michel. This opinion has been confirmed by several visitors who are familiar with Bunchy Top. It is important that the Law prohibiting the importation of banana suckers should be strictly observed by all, as a chance importation of the disease would be a serious blow to the banana industry in view of the fact that the insect vector *Pentalonia nigronervosa* is present in the Island.

Sugar Cane. Mosaic Disease.—The effect of the low market prices of sugar has been to cause planters to realize the need for additional yield per acre. The result is a general tendency toward better preparation of the land, more frequent replanting, and the establishment of nurseries of the heavier and more modern canes. Where this system has been practised, root disease has been much less prevalent while Mosaic has generally been better controlled. Great stress must be laid on the careful and frequent roguing of nurseries to eliminate the propagation of Mosaic infected stools, otherwise the advantage of nurseries over the promiscuous collection of tops from the field is entirely lost.

The distribution of P.O.J. seedlings during the present year will help materially in those places where for certain reasons such as the presence of grasses, the control of Mosaic is not successful from mere roguing. On the whole Mosaic is much less serious but still some estates have suffered considerably. In the Western part of the Island fall-planting with clean tops or cuttings has been proved to give much cleaner crops.

Root Disease.—(Marasmius sacchari). This disease is not infrequently found to a slight extent in most ratoon canes but rarely causes any damage until the third year. In two instances during 1927-28, serious damage was found in young plant canes and young first ratoons. This is most unusual and can only be accounted for in the rather heavy nature of the land, the probable unsuitability of the variety for the situation (D.116 in one case and Ba. 6032 in another). The damage was in each instance intensified and the root disease apparently assisted by infestation of Termites. (See Report on Insect Pests.)

Occasional cases of leaf diseases noticeably *Leptosphaera sacchari, van Beda,* were found, but the damage was rarely of consequence except under conditions which through various reasons, are not conducive to the maximum vigour of the canes.

Coconuts.—Bud Rot was uncommon, though it caused some trouble in parts of Westmoreland, especially on the poor sandy soils near the coast. It was reported as having caused considerable trouble in the Cayman Islands Dependency, but it would appear that this was the type of epidemic which follows a hurricane.

Leaf Diseases.—It has been very gratifying to hear comments by visiting scientists on the general good health of Jamaica coconuts as compared with many other parts of the West Indies. Nevertheless, the yellowing and premature dying of leaves still causes concern to some planters. In most leaf troubles, *Pestallozzia palmarum* and forms of *Diplodia* are usually found on the dead and dying leaves, but it has frequently been found that very similar symptoms exist, without the presence of these fungi. It is increasingly evident that these two fungi are of very secondary importance in these troubles. Careful search for root fungi has been made but without any positive result so far. The trouble exists in almost all groves to a lesser or greater degree, but is frequently found to be restricted to single trees surrounded by healthy ones with no signs of spreading. In other cases it occurs, in patches but even here there rarely is evidence of spread as might be expected from any infectious disease. Bad cases are invariably associated with adverse soil conditions and noticeably on heavy clays though it also occurs severely on dry 'bumps' and especially where there are outcrops of rock. Cleaning of the trees coupled with a little cultivation and attention to drainage on heavy lands with mulching on thin dry soils are methods which are being put to experiment.

Gummosis appeared in a few trees in a badly drained spot in the centre of a large grove in the East-end of the Island.

Coffee.—The Leaf Diseases caused by *Cercospora coffeicola,* B. and C. and *Stilbum flavidum,* occurred occasionally but rarely were serious, except where conditions were ideal for the coffee itself. The former disease is often found in nurseries.

Black Rot.—(Rosellinia sp.) is very common among settlers overcrowded coffee in the comparatively recently settled lands in Upper Manchester and Trelawny. Better clearing of tree stumps with proper spacing of the coffee together with the use of lime where this is available would materially affect the incidence of the disease. *Macrophomina phaseoli* has not yet been found in connection with this form of root disease.

During the Spring a large nursery of coffee seedlings was attacked by *Rhizoctonia solani* B. and G. causing a damping off which started to spread very rapidly. A timely application of Cheshunt Compound, made according to Bewley's formula, checked the disease most effectively, and saved what would otherwise have been a total loss.

Logwood.—A special investigation into the cause of death of logwood trees was carried out by request of planters in Westmoreland. The disease is the same as that investigated by Professor Earle, about twenty years ago. The trees wither and frequently die quite rapidly though occasionally the progress of the trouble is much more gradual.

Generally speaking, the disease was found in small patches and there are indications that the size of these areas has not increased appreciably, in some instances, since the previous investigation. The root systems of diseased trees are invariably invested with mycelium showing clamp-connections but great difficulty was found in tracing any direct connection with a Basidiomycete fructification. In a few cases however, direct connection was traced with fructifications of *Ganoderma lucida,* Karst and although other fungi may be also connected with the disease, there seems to be little doubt that this fungus is the principal cause of the trouble.

Observations have now been made throughout the Island, and it has been convincingly evident that the disease only attains serious proportions on heavy clays underlying a thin layer of soil. Instances have been noticed, however, where the disease has appeared equally severely where the underlying rock reaches

the surface. No cases apart from solitary individual trees have been observed on land having a good depth of soil, even when a clay sub-soil is present.

Tobacco.—The most serious disease encountered is Mosaic, which in some instances caused considerable damage. It is very pleasing to notice, however, that a few more progressive of the smaller growers now realise the ease with which this disease is transmitted and are taking the necessary precautions when handling their plants. Damping off and *Phytophthora nicotinae* were both observed during the year, but with one exception were not serious.

Other Crops.—Mosaic diseases were very apparent in certain leguminous and cucurbitaceous crops. Tomatoes and Irish potatoes were found to be infected frequently though potatoes are largely remarkably free from virus troubles. The constant importation of seed potatoes undoubtedly helps to reduce the loss from Leaf Roll and Mosaic and it will be essential for careful roguing to be carried out if the saving of native seed for early crops is to be made a success.

Throughout the Island, papaws are subject to a disease but this trouble is most noticeable on the Liguanea Plain. The plants are attacked at all ages, but more often the symptoms do not appear until the tree is about reaching the bearing stage. The terminal leaves as they emerge from the bud are yellow and frequently mottled while their size gradually becomes reduced until nothing but a pencil point is left. By the time this stage is reached the larger leaves hang down and gradual death is the result. Usually some adventitious buds lower on the stem start into growth, but the majority of these suffer the same fate, and strong growth is never regained. While root attack is suggested by the symptoms, it has not been possible to associate the symptoms with unhealthy root systems and failure to find any organism in the tissues coupled with the mottling suggest that it is a virus disease. It has not been found that the disease is carried in the seed and other methods of transmission of a possible virus are being investigated.

Throughout the stretch of country between Christiana and Ulster Spring a great deal of trouble is experienced with a disease locally known as Black Rot. It is a root trouble caused by one or possibly more forms of *Rosellinia*. *Rosellinia bunodes* has been found but owing to the general tendency to form vegetative reproductive bodies, rather than perithecia, there is still very considerable doubt as to this being the only species present. The type of growth of the hyphae also suggests another species. All crops are attacked; yams, cocoes, ginger and coffee most severely, and bananas, oranges and similar crops less frequently. The Avocado pear is most susceptible. By experiment it has been found impossible to infect seedlings (two feet high) of the sour or Seville orange, though similar plants of coffee and grapefruit were killed within a month. The type of mixed cultivation made by the settlers in this area is conducive to the propagation of the disease since no single piece of ground ever becomes entirely free from a crop. Complete and thorough cultivation therefore becomes impossible. Further, in clearing the virgin bush, too many tree stumps are allowed to remain in the ground and so form a centre of infection. Experiments on thorough cultivation with the application of lime and planting of crops at reasonable distances, promise to give very satisfactory returns.

Entomogenous Fungi.—The experiment referred to in the previous report with the Pimento White Fly proved to be slightly successful in that two definite cases of infection with *Aschersonia aleurodis* were found. Since the situation was so dry and in view of the protracted drought, it was not possible to continue the experiment.

It has been observed that a brown form of *Aschersonia*, probably A. *goldiana*, is abundant on both citrus scales and the Black Fly in a few situations. From general observations it would appear to be more deadly than *A. aleurodis* though more of the leaf surface is covered. Further study is needed to prove whether the fungus is a form of a black organism invariably associated with it.

Fermentation.—The demand for pure cultures of yeasts for common clean rums has been absolutely nil for some time since planters realize that if the first settings are made with sufficient nitrogenous food for the yeast, either in the form of dunder or other suitable material, trouble is rarely experienced in getting a good working wash in the normal time.

A tour of the flavoured rum distilleries was made in the Spring. With one exception there was no request for further cultures of Schizosaccharomyces, but assistance is being given on one estate.

Experiments were carried out in preserving orange juice for export with a fair measure of success. The samples have been submitted for trade criticism.

Orchid Raising.—In connection with the Departmental scheme for the establishment of an orchid industry in the Island, further trials have been made in germinating seed by asymbiotic methods. Some of these have been successful but great difficulty has been experienced in sterilizing the small and fragile seeds owing to the frequent presence of resistant organisms on over-ripe pods.

Inspections.—Plants for export have been examined for diseases and certificates issued. Consignments of seed potatoes have been examined on landing and in all cases found to be free from any dangerous diseases.

Banana Varieties.—The field work in connection with these experiments has remained in the hands of the Supervising Inspector, whose report on the work is given elsewhere.

At Hope, the investigations have been restricted to the testing of varieties for resistance to Panama Disease and in efforts to raise the more difficult crosses.

The work has received some setbacks in shortage of material to work upon as the banana walk had to be partly replanted, and through loss of some large quantities of fruit and maturing plants from wind at various times during the year.

Crosses have been successful with the Gros Michel and Lacatan and seedlings have been raised.

Numerous efforts have been made in endeavouring to obtain seeds from the more promising existing varieties by self fertilization. Several seedlings of selfed Gros Michel were obtained but by a stroke of misfortune, they were destroyed. Work on these lines is continuing, however, and with the increase in available material it is hoped that such seedlings will be raised during the coming year.

It has been found possible to germinate pollen of all the available varieties.

Fungus Collection.—Several important additions have been made to the collection during the year but these are mostly pathogenic forms. It is hoped that a fairly complete list of Jamaican fungus diseases will be published during the coming year.

The Island was visited by Dr. Wardlaw, of the Imperial College, Trinidad, during the late summer and he was shown the principal banana areas. Other mycologists have also visited the Department. Such visits are appreciated in that they stimulate interest and thought.

I have to acknowledge most gratefully the assistance given me by the Imperial Bureau of Mycology, the United States Bureau of Plant Industry, and many other institutions and individuals for information and for the exchange of literature.

F. E. V. Smith,
Government Microbiologist.

Banana Breeding Experiments.

Report of Supervising Inspector of Plant Diseases.

Pollinations of all bunches of bananas were carried out on both breeding plots at Hardware Gap and Castleton. At Hardware Gap 132 bunches were pollinated and reaped. Only the Ram Kela variety produced seeds and these proved to be unfertile. This breeding station at a high altitude has not proven a success and has therefore been abandoned.

At Castleton a large amount of seeds were produced but a very small percentage germinated. In one instance we got 16 seeds from one bunch of Gros Michel Banana crossed with the Robusta.

The drought affected the seedlings grown on the Liguanea plains so very much that to save them all plants had to be hurriedly transplanted on good irrigable sites at the St. Catherine District Prison. Two bunches of the Gros Michel x Robusta Cross were reaped. The fingers were short owing to drought, but it is encouraging that no seeds were present in any of the fingers. Four suckers from two different crosses of Gros Michel x Robusta were planted in the infected area at the Laboratory on the 27th April, 1928. Gros Michel plants died on these spots from Panama Disease within four months of planting and on the removal of the dead plant the seedlings were introduced. One plant of the cross died after a lapse of seven months but the other three are still healthy.

There are now growing in the St. Catherine District Prison plot the following seedling bananas:—

Parentage.	Plants.
Gros Michel x Robusta	124
Rubra x Robusta	51
Ram Ke'a x Robusta	54
White House x Robusta	18
Honey x Robusta	13
White House x Gros Michel	6
Ram Kela x Gros Michel	12
White House x Kewensis	9
Pink Gros Michel x Robusta	8
Total	295

The "Norther" in November, blew down 90 per cent. of the breeding stock of bananas at Castleton and thus pollination has been impeded.

The "Gros Michel Robusta" seedlings have been growing luxuriantly and bunches will be produced within the next three months.

J. B. Sutherland,
Supervising Inspector of Plant Diseases.
29.1.1929.

Insect Pests in Jamaica in 1928.

Report of the Acting Government Entomologist.

Since the death of the late Entomologist, C. C. Gowdey, the investigational side of the work has been largely in abeyance though the advisory work and two particular investigations have been carried out by the Microbiologist.

The more important pests and matters dealt with during the period were:—

Banana.—The Banana Borer, *Cosmopolites sordidus, Germ.* continued to give trouble in many places, but especially in old ratoon fields. In one instance it was jointly responsible with the drought for a 95 per cent. supplying of a piece of plant bananas. The results with further experiments with para-dichlorbenzene compounds have not all been as satisfactory as expected and additional work with this material will be required.

A special investigation was carried out on scarring of banana fruit, a trouble which was very prevalent during the late summer. It was found that this damage was merely superficial and did no damage apart from disfiguration. There is also no risk in exporting such bananas. Slugs were proved to be the principal cause of the damage though possibly other insects may be capable of causing similar scars. No trace of the Central American moth, *Ammalo helops,* has yet been found in the Island. This form of damage was largely found in semi-abandoned bananas and fields bordering on bush. It would appear that the protracted drought was responsible in driving the slugs and other pests from their natural habitat in search for more succulent food. With the advent of autumn rains the scarring largely disappeared.

A second special investigation was also carried out in connection with the possibilities of importing pests and diseases into the Island from other countries, especially from banana areas, and a report on the matter submitted to the Government.

Citrus.—Miscible oils continued to prove their effectiveness in controlling scale insects and the Black Fly. A considerable reduction in price will be necessary before these oils can be used to any large extent.

Pimento.—The Pimento White Fly was still apparent in the previously noted localities. The results of an attempt to infect with a controlling fungus are given in the report of the Microbiologist.

Sugar Cane.—The pests recorded in the previous report were again noticed. The Fall Army Worm, *Laphygma frugiperda,* Sm. and Abb. caused damage to this and other crops.

Termites were responsible for damage in association with root disease. It is claimed that the application of fresh coconut 'meat' on the affected spots attracted 'stinging ants' which held the Termites in check.

Sweet Potato.—The bug, *Corecoris fuscus,* Thumb. was responsible for considerable damage to settlers' crops in the West end of the Island.

I gratefully acknowledge assistance from many individuals especially from the Imperial Bureau of Entomology and the Research Branch of the United Fruit Co.

F. E. V. Smith,

VI.—AGRICULTURAL EDUCATION.

Report of Headmaster, Government Farm School.

Numbers.—The maximum number of students was registered for the whole year. In each of the terms one student did not report, making our numbers 53 instead of 54.

The following 19 students completed their Three Years' Course in December:—

W. B. Marr	N. F. Ottey	B. A. Woodburn
K. J. Heron	I. K. Hunter	C. M. Daly
B. Black	W. S. Chin	G. B. Kerr
R. E. Maxwell	H. H. Brown	A. V. Keeling
W. L. Collins	M. D. Wilson	H. H. Henry
C. W. Hastings	C. W. Swaby	H. G. Vickers.
	B. E. Lecky	

This number is the record in the history of the School.

Curriculum.—The new workshop has been of immense benefit to the manual training class. It has added interest to the work of both the Instructors and the students in the branch of the School.

As the demand for admission to the School during the last two years has been in excess of our accommodation, we have been able to insist on a higher standard of education before admission. The effect of this selection is that we have been able to raise the standard of the instruction in the Lecture Rooms.

An epidemic of Influenza in the Christmas term seriously interfered with the work.

General.—The Recreation Room has been of excellent use as a means of improving the social life of the students.

The School Laboratory building is complete and we hope to be able to use the Laboratory for the Mid-summer Term.

The thanks of the School are due to Messrs. Hallet and Lecky for the continued activity of the Farm School Branch of the Students' Christian Movement. This organization has made steady progress and supplies a really necessary part of the Students' activities.

There has been a steady stream of enquiries about the School during the year and we have had no difficulty in selecting students to bring our numbers up to 60 for the Easter Term, 1929. We received 45 Forms of Application for 25 vacancies.

A very encouraging feature of our School life is the fact that an increasing number of the students remain for the full course of three years.

1910-1914:	per cent.	Students	completing	Course. 61
1915-1919:	do.	do.	do.	57
1919-1928:	do.	do.	do.	80

The actual number of students in residence has improved during the last three years. The average attendance has been:—

1919.	1920.	1921.	1923.	1924.	1925.	1926.	1927.	1928.
24	41	42	29	31	25	39	43	53

It will be noticed that during the period of part-war depression a severe reaction was shown in our numbers.

An analysis of the subsequent career of the 70 students who left the School during period 1922-1927 indicates the following:—

On own properties	14
Book-keepers and Overseers	22
Department of Agriculture	5
Banana Agents	2
Employed in Central America	9
U. S. A., Cuba, and Bahamas	6
Business Clerks	4
Civil Service	1
Dead	1
Not traced	6

Those employed in Central America, Cuba and Bahamas are engaged in Agriculture, and it would appear from the data available that 58 out of 70 students are putting in practice the lessons taught at the School.

(Sgd.) R S. Martinez,
Headmaster.

Report of Medical Officer.

Half-way Tree,
12th January, 1929.

I have the honour to report that during the first part of the year ending 31st December, 1928, the general health of the students of the Hope Farm School was excellent. In the latter part of the month of October, however, there was an outbreak of Influenza, which at that time was epidemic in Kingston and St. Andrew. 25 students, and two foremen contracted the disease.

The services of a trained nurse were obtained and the sick students isolated in one of the dormitories. No serious complication developed except in one student who had a severe attack of catarrhal jaundice.

The students, attendants and servants were inoculated against Enteric Fever.

The sanitary conditions were good

I am,
Sir,
Your obedient Servant,
(Sgd.) Lewis A. Crooks,
M.B., C.M. (Edin.)

The Director of Agriculture,
Hope Gardens, St. Andrew.

VII.—LIVE STOCK.

A.—Government Stud Farm, Grove Place, Manchester.

Live Stock, Grove Place, 1928.

	2 Grade Montgomery Bulls
	2 Pedigree Aberdeen Angus Bull Calves
	2 Bull Calves of 1927
10—	4 Bull Calves of 1928
	3 Pedigree Cows
12—	9 Pedigree Heifers
78—78	Native Dairy Cows
	4 Grade Native Heifers
	1 Grade Devon Heifer
	5 Grade Ayrshire Heifers
	24 Grade Guernsey Heifers
	4 Grade Hissar Heifers
	23 Grade Jersey Heifers
	1 Grade Montgomery Heifer
	5 Grade Red Poll Heifers
73—	6 Grade Swiss Heifers
8—	8 Steers
181	

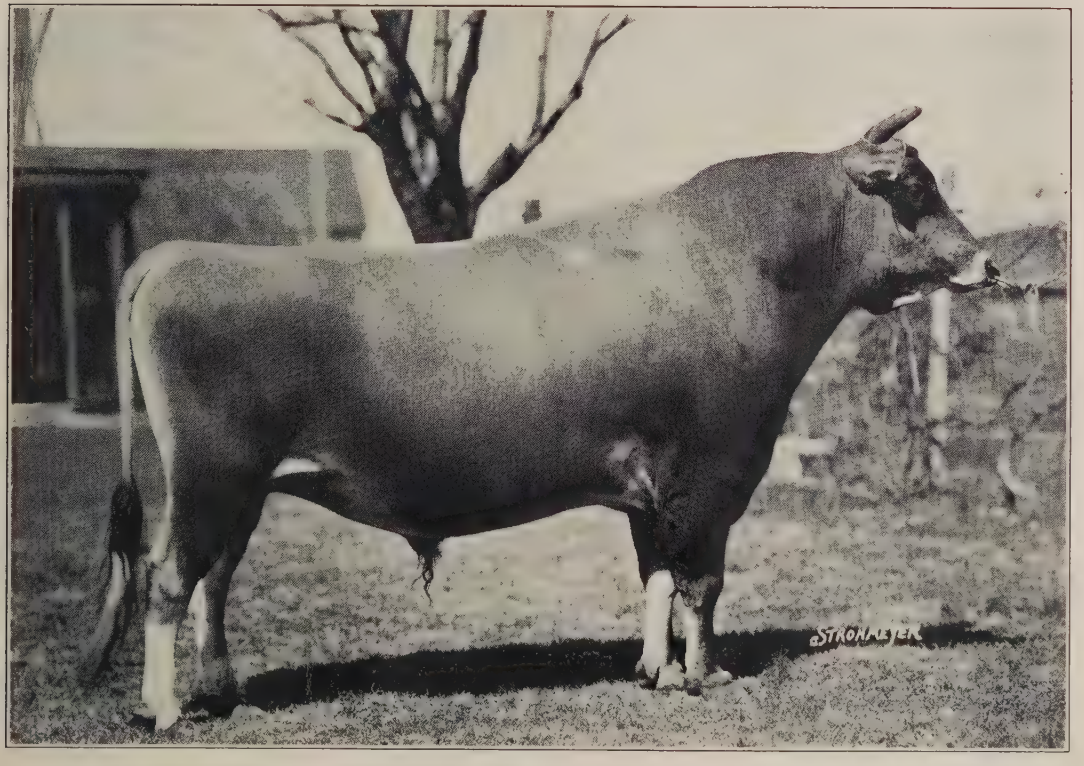
Horsekind.—

1 Imported Proof Ass "Kentucky Boy"
10 Brood Mares
4 Fillies
1 Colt
1 Gelding
19 Mules
2 Donkeys
38 Head

The following is the Summary of the Valuation of the Live Stock at Grove Place on March 31st, 1928:—

	£	s.	d.
Cattle	1,328	0	0
Horsekind	753	0	0
Total Pen Stock ...	2,081	0	0

IMPORTED RED POLL BULL—"RUPERTA'S TEDDY, A. R."



IMPORTED JERSEY BULL—"GLEN'S FONTAINE LAD."

TWO STUDD BULLS—GOVERNMENT STOCK FARM, HOPE.

SERVICES OF BULLS AT GROVE PLACE, JANUARY 1ST TO DECEMBER 31ST, 1928.

No.	Bulls.	Visiting Cows.	Farm Cows.	Total.
1.	Brown Swiss "Trumpeter"	1	3	4
2.	Jersey "Hon. Mr. Polo"	1	2	3
3.	Jersey "Etta's Pogis"	13	11	24
4.	Red Poll "Pilot"	4	8	12
5.	Grade Montgomery "Cortes"	9	5	14
6.	Native Aberdeen Angus, "Duke of Clarence"	..	2	2
7.	Devon "Highfield Nobleman"	1	1	2
8.	Montgomery-Brown Swiss "Sigmund"	..	1	1
		29	33	62

B.—GOVERNMENT STOCK FARM, HOPE.

Live Stock Hope Stock Farm, 1928.

PEDIGREE STOCK.

Red Polls—			
Imported Red Poll Bull	1		
Pedigree Native Red Poll Bul Calves	2		
Imported Red Poll Cows l	2		
Native Red Poll Cows and Heifers	33	38	
Jerseys—			
Imported Jersey Bull	1		
Native Jersey Bull and Bull Caves	3		
Imported Jersey Cow l	1		
Native Jersey Cows and Heifers	28	33	
Guernseys—			
Native Guernsey Cows and Heifers	4	4	
Ayrshire—			
Native Ayrshire Bull and Bull Calves	3		
Imported Ayrshire Cows	2		
Native Ayrshire Cows and Heifer	3	8	
Brown Swiss—			
Native Brown Swiss Cows and Heifer	6	6	
Montgomery—			
Imported Montgomery Bull	1	1	
Total Pedigree Stock		90	

GRADED STOCK.

Bulls—			
Grade Montgomery Bulls	5		
Grade Guernsey Bulls	5		
Grade Jersey Bulls	2	12	
Cows—			
Dairy Cows	118		
Foster Mothers	12	130	
Heifers—			
Grade Native Heifers	4		
Grade Angus Heifer	1		
Grade Ayrshire Heifers	7		
Grade Guernsey Heifers	41		
Grade Jersey Heifers	25		
Grade Montgomery Heifers	9		
Grade Nellore Heifer	1		
Grade Red Poll Heifers	3		
Grade Swiss Heifer	1	92	
Steers—			
Plough Steers	12	12	
Total Graded Stock		246	
Grand Total		336	

Horsekind—
17 17 Mules

Poultry—
1 Pen Rhode Island Reds
Bees—
Nil.

WEEKLY ANALYSIS OF MILK SUPPLIED TO THE PUBLIC HOSPITAL, LUNATIC ASYLUM AND GENERAL PENITENTIARY BY THE STOCK FARM, 1928.

Quarter ending	Solids.	Fat.	Sp. Gravity.	Solids.
March 31, 1928	13.04	4.33	1.0308	8.71
June 30, 1928	13.28	4.43	1.0312	8.85
September 30, 1928	13.71	4.90	1.0307	8.81
December 31, 1928	13.92	5.20	1.0301	8.72
	13.49	4.72	1.0307	8.77

The following is a summary of the Valuation of the Live Stock at the Hope Stock Farm to March 31st, 1928.

	£	s.	d.
Cattle	7,422	10	0
Horsekind	336	0	0
Poultry	39	0	0
Total	7,797	10	0

MILK YIELD, DAIRY HERD 1924, 1925, 1926, 1927, 1928.

Imperial Quarts per diem.

Month.	1924.	1925.	1926.	1927.	1928.
January	264.4	304.9	401.0	433.7	400.1
February	238.2	324.0	386.3	392.0	353.1
March	249.3	369.3	414.4	407.4	401.6
April	224.2	441.9	435.8	459.2	478.3
May	271.4	513.7	453.2	503.1	520.6
June	337.8	504.1	485.2	444.4	533.0
July	376.1	457.9	511.4	476.1	564.1
August	356.0	464.0	567.6	489.4	557.5
September	365.6	438.4	519.2	456.2	524.7
October	370.4	432.9	526.8	396.9	463.0
November	326.3	393.1	492.1	424.6	445.7
December	314.6	396.7	473.3	429.7	455.4
	307.9	420.1	472.2	442.7	474.7

RECORD OF DAIRY HERD MILK YIELD, 1928.

Month.	Av. No. of Cows.	Total Qts. per mensem.	Av. per Cow Qts.
January	82	12,401.6	4.9
February	80	10,239.9	4.4
March	87	12,450.2	4.6
April	92	14,350.3	5.2
May	94	16,139.1	5.5
June	101	15,991.5	5.3
July	104	17,487.9	5.4
August	104	17,282.4	5.3
September	99	15,740.4	5.3
October	96	14,353.8	4.8
November	93	13,369.6	4.8
December	89	14,119.0	5.1
	93	14,493 8	5.1

MILK YIELD, 1928, HOPE DAIRY HERD.

No.	Name of Cow.	Breed.	Age in years.	Averag content Milk fat.	Yield in lbs.	Milking Weight.	Max. yield Imp. Qts.	Sale Price at 8d. per Qrt. £ s. d.
1	Kara 1st	Grade Holstein	8	4.0	8,211	1,130	23.2	105 12 6
2	Porosa 2nd	Grade Red Poll	7	3.9	7,560	1,110	10.5	97 5 4
3	Marchioness 12th	Grade Montgomery	6	4.8	7,135	1,074	13.7	91 15 10
4	Dodo 1st	Grade Holstein	9	3.7	6,414	1,176	19.1	82 10 5
5	Cognac 2nd	Grade Holstein	6	4.0	6,055	942	19.3	77 17 7
6	Diva 10th	Grade Guernsey	4	5.0	5,886	940	11.0	75 14 6
7	Alicia	Grade Jersey	4	4.2	5,649	934	11.5	72 13 11
8	Quail 4th	Grade Brown Swiss	7	4.0	5,630	982	9.8	72 8 10
9	Freda 1st	Grade Holstein	8	4.0	5,630	970	11.6	72 8 8
10	Rosette 4th	Grade Guernsey	7	4.4	5,577	932	10.3	71 14 9
11	Desiree 3rd	Red Poll	7	3.7	5,534	1,043	16.4	71 4 1
12	Norbrook 4th	Grade Jersey	3	4.7	5,448	900	12.5	70 1 10
13	Sayda	Jersey	5	4.9	5,387	868	13.5	69 6 2
14	Portia	Jersey	6	4.1	5,331	880	17.6	68 11 6
15	Sola 5th	Grade Zebu-Jersey	9	4.1	5,304	1,180	14.0	68 5 0
16	Dolly 1st	Grade Brown Swiss	7	4.1	5,295	1,104	10.6	68 2 0
17	Blossom 1st	Grade Zebu-Jersey	10	4.2	5,291	970	12.0	68 1 6
18	Pussy 2nd	Grade Red Poll	5	4.0	5,281	1,134	17.4	67 16 3
19	Dolly 3rd	Grade Jersey	4	4.9	5,224	970	8.9	67 3 9
20	Diva 7th	Grade Guernsey	7	4.4	5,150	820	10.4	66 5 2
21	Perfect	Jersey	5	4.4	5,010	850	15.5	64 9 4
22	Angela	Jersey	3	4.9	5 002	862	14.8	64 7 0
23	Hood's Mead	Jersey	4	4.8	4,957	1,038	14.3	63 15 5
24	Lizzie 3rd	Grade Jersey	5	5.0	4,930	960	11.6	63 8 3
25	Pogistine	Jersey	5	4.3	4,777	774	17.9	61 9 1
26	Tilda 7th	Grade Jersey	4	4.8	4,762	750	9.1	61 5 4
27	Monica 3rd	Grade Zebu-Jersey	11	4.0	4,749	864	11.6	61 1 10
28	May 4th	Grade Jersey	6	4.6	4,583	794	9.3	58 19 3
29	Jimmy's Pansy	Jersey	4	4.3	4,575	740	8.2	58 17 1
30	Hope Betty 5th	Red Poll	4	4.5	4,568	1,040	14.3	58 15 7
31	Sola 13th	Grade Jersey	5	4.2	4,558	900	8.3	58 13 10
32	Hope Beta 5th	Red Poll	6	3.9	4,483	960	18.0	57 13 8
33	Hope Brisk 1st	Red Poll	9	3.6	4,472	1,122	13.6	57 10 9
34	Nana 4th	Grade Montgomery	3	5.4	4,470	912	8.1	57 10 3
35	Badge 2nd	Grade Zebu-Jersey	10	4.9	4,449	970	8.0	57 4 8
36	Monica 12th	Grade Guernsey	8	4.6	4,432	918	11.9	57 0 0
37	Hope Flighty 1st	Red Poll	5	4.2	4,423	854	5.7	56 18 2
38	Dodo 3rd	Grade Holstein	5	3.6	4,406	1,142	6.2	56 13 6
39	Hood's Ethelstine	Jersey	5	5.6	4,381	872	9.3	56 7 5
40	Paste 1st	Grade Jersey	3	4.8	4,371	778	12.7	56 4 8
41	Pigeon 2nd	Grade Brown Swiss	7	4.6	4,335	989	11.3	55 15 4
42	Mirage 3rd	Grade Jersey	5	5.2	4,330	942	11.9	55 14 3
43	Stocking 5th	Grade Jersey	4	4.2	4,283	820	8.2	55 1 11
44	Red Girl 3rd	"	6	4.2	4,228	960	13.0	54 8 0
45	Jimmy's Ethelstine	Jersey	4	5.0	4,208	844	11.2	54 2 10
46	Ethelstine 2nd	"	6	4.4	4,189	820	12.2	53 17 10
47	Perfume	"	6	5.1	4,147	814	13.0	53 7 2
48	Angel 11th	Grade Holstein	6	4.5	4,093	1,106	14.4	52 13 1
49	Lydite 3rd	"	6	4.0	4,022	1,032	15.9	51 15 0
50	Peri-lusta	Jersey	3	3.7	3,955	870	11.0	50 17 8
51	Casilda 7th	Grade Jersey	3	4.6	3,918	970	7.9	50 7 10
52	Pussy	Grade Red Poll	13	5.0	3,872	1,070	10.8	49 16 6
53	Estella	Red Poll	5	4.4	3,847	942	15.1	49 10 0
54	Baby 4th	Grade Jersey	3	5.1	3,789	854	11.1	48 15 1
55	Abbess	Red Poll	5	3.8	3,778	1,240	10.0	48 11 11
56	Lizzie 4th	Grade Jersey	4	5.2	3,776	910	11.5	48 11 6
57	Matilda 12th	"	6	4.1	3,743	856	11.1	48 3 5
58	Bess 1st	Grade Guernsey	8	4.6	3,739	1,000	12.0	48 2 3
59	Hope Beta 3rd	Red Poll	8	4.4	3,650	945	9.7	46 19 4
60	Hope Flighty	"	10	3.9	3,650	1,014	13.4	46 19 3
61	Mystery	Red Poll-Jersey	7	3.9	3,617	877	13.8	46 10 4
62	Diva 15th	Grade Guernsey	3	5.6	3,591	810	11.4	46 4 2
63	Mirage 1st	"	8	4.6	3,567	850	6.1	45 18 0
64	Monica 6th	Grade Brown Swiss	7	4.2	3,565	1,112	12.2	45 17 3
65	Hope Brisk 3rd	Red Poll	5	3.9	3,554	950	11.0	45 14 1
66	Diva 6th	Grade Guernsey	7	5.2	3,546	786	8.2	45 12 6
67	Monica 15th	"	3	3.8	3,546	845	10.3	45 12 6
68	Truth 4th	Grade Jersey	6	3.9	3,527	980	10.3	45 7 8

Hope Stock Farm, Year 1927-28, ending March 31, 1928.

Statement of Revenue and Expenditure.

Revenue.	£	s.	d.	£	s	d.
Plantation (Pines)	123	4	3½			
Live Stock Sales	968	11	9			
Pasturage Fees	40	0	0			
Rents	73	4	10			
Dipping Fees	1	0	2			
Poultry Fees	43	1	3			
Butter Sales	74	16	1			
Bombay Mango Sales	348	6	9½			
Rearing Calves for Grove Place	8	10	0			
Mlk Sales	4,730	13	5			
Baink Interest	30	4	4			
Miscellaneous	14	1	11	6,455	14	10
Excess Expenditure over Revenue				437	15	4
				£6,893	10	2

Expenditure.	£	s	d.	£	s.	d.
Buildings—Repair and Upkeep	17	9	6			
Additions and Improvement	1,533	19	3	1,551	8	9
Machinery—						
Repairs and Upkeep	82	4	11			
Additions and improvement	86	1	11	168	6	10
Furniture and Fixtures—						
Repairs and Upkeep	4	7	0			
Additions and Improvement	64	17	0	69	4	0
Truck, Repairs and Upkeep	80	19	9			
Tools and Implements—						
Repairs and Upkeep	46	18	6			
Additions	74	2	0	121	0	6
Vehicles and Harness—						
Repairs and Upkeep	47	10	1			
Stores and Parts				135	6	1
Plantations (Pines) Growing	75	12	1			
Plantations Sale Expenses	9	13	7	85	5	8
Live Stock Purchases				634	11	4
Rent—Commission collecting				22	2	4
Wages				936	2	7
Butter				22	5	0
Cleaning and Fencing				476	0	7½
Bombay Mangoes—						
Budding	12	18	0			
Sale Expenses	76	14	10			
				89	12	10
Taxes				10	12	0
Rearing Calves at Grove Place				61	18	0
General Repairs				192	12	6
Profit and Loss				15	0	0
Food for Stock				1,650	1	3½
Public Demonstration				39	13	8
Foreman's Salary				121	0	0
Miscellaneous				362	16	4
				£6,893	10	2

Profit and Loss Account.

	£	s.	d.		£	s.	d.
To Repairs and Upkeep Building	17	9	6	By Plantations (Pines)	37	18	7½
Ditto Machinery	82	4	11	Live Stock	1,331	0	5
Ditto Furniture and Fixtures	4	7	0	Rents	51	2	6
Ditto Truck	80	19	9	Pasturage	40	0	0
Ditto Tools and Implements	46	18	6	Dipping Fees	1	0	2
Ditto Vehicles and Harness	47	15	1	Poultry	43	1	3
Wages	936	2	7	Butter	52	11	1
Cleaning and Fencing	476	0	7½	Mangoes	271	11	11½
Budding Bombay Mangoes	12	18	0	Rearing Calves for Grove Place	8	10	0
Taxes	10	12	0	Milk	730	13	5
				Bank Interest	30	4	4
				Miscellaneous	14	1	11
Carried forward ..	£1,715	7	11½	Carried forward ..	£6,611	15	8

PROFIT AND LOSS ACCOUNT, *contd.*

Brought forward ..			£1,715 7 11½	Brought forward ..		£6,611 15 8
Rearing Calves at Grove Place			61 18 0			
General Repairs			192 12 6			
Profit and Loss (refd. for year 1926-27)			15 0 0			
Food for Stock			1,408 16 11½			
Public Demonstration			39 13 8			
Foreman's Salary			121 0 0			
Miscellaneous			362 16 4			
Depreciation—						
Buildings	£23 14 0					
Machinery	68 5 5					
Furniture and Fixtures	31 14 6					
Truck	10 0 0					
Tools and Implements	22 5 6					
Vehicles and Harness	43 11 6		199 10 11			
			4,116 16 4			
Balance Profit for the Year			2,494 19 4			
			£6,611 15 8			£6,611 15 8

BALANCE SHEET.

Buildings—				Jamaica Government		£1,983 19 3
As at 31.3.27 £	658 2 10			Accounts Payable		270 14 11
Additions	1,533 19 3			Profit and Loss Account—		
	2,192 2 1			As at 31.3.27	£9,458 9 1	
Depreciation	23 14 0	2,168 8 1		add Profit for the year	2,494 19 4	11,953 8 5
Machinery—						
As at 31.3.27	701 8 11					
Additions	86 1 11					
	787 10 10					
Depreciation	68 5 5	719 5 5				
Furniture and Fixtures—						
As 31.3.27	358 1 6					
Additions	64 17 0					
	422 18 6					
Depreciation	31 14 6	391 4 0				
Truck—						
As at 31.3.27	60 0 0					
Depreciation	10 0 0	50 0 0				
Tools and Implements—						
As at 31.3.27	64 10 0					
Additions	74 2 0					
	138 12 0					
Depreciation	22 5 6	116 6 6				
Vehicles and Harness—						
As at 31.3.27	345 16 6					
Less Parts used during the year	0 5 6					
	345 11 6					
Depreciation	43 11 6	302 0 0				
Stores and Parts		209 5 1				
Plantations (Pines)		100 0 0				
Live Stock		7,797 10 0				
Food for Stock		734 5 2				
Accounts Receivable		201 14 3				
Cash		1,418 4 1				
		£14,208 2 7				£14,208 2 7

N. B. DONALDSON, Accountant.

H. H. COUSINS, Director of Agriculture.

VIII.—GOVERNMENT LABORATORY.

Report of the Deputy Island Chemist.

The total number of samples analysed during the year ended 31st December, 1928, was 2,659. This number constitutes a record over any previous year, and compares with the two former years as under:—

1926.	1927.	1928.
2,056	2,407	2,659

The samples are classified as follows:—

"A" Official.

(I) *Police*—	
Human Viscera and Organs	59
Stomach Contents and Vomits	7
Substances for poison	75
Coins, genuine	31
Coins, counterfeit	84
Counterfeiting Exhibits	45
Medicines and Drugs	32
Under the Adulteration of Food and Drugs Law.	
Wines, adulterated	5
Fresh Milks, adulterated	1
Under the Spirit License Law.	
Rums	10
Whisky	1
Wines	7
Beer and Stout	3
Under the Drugs and Poisons Law.	
Drugs and Chemicals	3
Under the Petroleum Law.	
Kerosines	1
Under the Dangerous Drugs Law.	
Opium	24
Ganga	639
Ganga smoking exhibits	30
Under the Agricultural Produce Law.	
Orange Oils, adulterated	15
Total	1,072
(II) *Customs*—	
Native and other wines	51
Rectified Spirits and Absolute Alcohols	20
Industrial Alcohols	25
Fuel Oils	26
Gasolines	13
Disinfectants and Insecticides	7
Flavouring Extracts	6
Sugars	8
Condensed Milks	2
Miscellaneous	5
Total	163
(III) *Department of Science and Agriculture*—	
Animal Viscera	5
Oranges and Grape Fruit	16
Feeding Stuffs	3
Insecticides and Fungicides	4
Miscellaneous	3
Total	31

(IV) *Medical Department*—	
Waters, Potable	4
Margarines	3
Total	7
(V) *Medical Officers of Health, Kingston*—	
Fresh Milks, genuine	10
Do adulterated	9
St. Andrew—	
Fresh Milks, genuine	51
Do adulterated	22
Other Parishes—	
Waters, Potable	7
Drugs	1
Aerated Waters	1
Rums	2
Fresh Milks, adulterated	1
Total	104
(VI) *Department of Public Works*—	
Water, Irrigation	45
Total	45
(VII) *Prisons Department*—	
Limestones	2
Total	2
Total Official ..	1,424

"B" Agricultural.

Soils and Sub-soils	32
Agricultural Limes and Marls	27
Artificial Manures and Fertilizers	15
Distillery Products	3
Total	77

"C" General.

Stock Farm Milks	736
Cattle Dips	62
Rums	127
Sugars	105
Fresh Milks	10
Copras and Press-cakes	11
Waters, Potable	24
Industrial	11
Oils, Edible	2
Essential	4
Fuel and Mineral	5
Steam Coals	6
Minerals and Ores	11
Coal Tars	4
Wines and Beers	7
Animal Viscera	1
Substances for Poison	9
Medicines and Drugs	5
Gasolines	4
Miscellaneous	14
Total	1,158
Grand Total ..	2,659

The 59 analyses of human viscera and 7 of stomach contents and vomits were made in connection with 32 deaths. In 17 cases poison was found and determined in the viscera as follows:—

(1) 0.24 grains Yellow Phosphorus from the organs of a female adult.
(2) 0.03 grains Yellow Phosphorus from a female child.
(3) 0.45 grains of an alkaloid resembling aconitine from the viscera of a male adult.
(4) 5.25 grains of Opium alkaloids from the organs of a female adult.
(5) Large traces of Ptomaines from the viscera of an adult female.
(6) Large traces of Arsenic from the organs of a female child.
(7) Large traces of Arsenic from the viscera of a male child.
(8) Traces of Arsenic from the organs of a male child.
(9) Large traces of Arsenic from the viscera of a male child.
(10) Alcohol from the stomach of a male adult.
(11) 0.1 grain Tartar Emetic from the organs of a female.
(12) 0.1 grain Arsenic from the viscera of a male adult.
(13) 0.1 grain Arsenic from the organs of a male adult.
(14) 0.03 grains Arsenic from the organs of a male adult.
(15) 0.096 grains Arsenic from the viscera of a female adult.
(16) 18 grains Alcohol from the stomach of a boy.
(17) 0.005 grains Arsenic from the organs of a male infant.

The substance examined for poison which gave positive results were as follows:—

(1) 3 grains Arsenic in soup (5 persons vomited).
(2) Rat Poison found to consist of Zinc Oxide and Starch.
(3) 0.6 grain Yellow Phosphorus and large traces of Arsenic in medicine in connection with the death of a female adult.
(4) Arsenic in a mug which had contained milk.
(5) Cooper's Dip in a bottle of liquid.
(6) Arsenic in yam which had caused the death of a male child, and serious symptoms in 3 other children.
(7) Arsenic in loaves of bread.
(8) Arsenic in yeast and dough.
(9) Arsenite of Soda in a piece of cloth. } In connection with an attempt at poisoning at a
(10) Arsenite of Soda in earth. } country bakery.
(11) Cooper's Dip in milk.
(12) Yellow Phosphorus in dumplings.
(13) Arsenic (Cooper's Dip) in cooked food.
(14) 30 grains powdered glass in cooked food.
(15) 2.25 grains Strychnine in meat patty that had caused death of a dog.
(16) 2.59 grains of Arsenic in bread.
(17) 15 grains Arsenic (Arsenite of Soda) in paper. Used in connection with the poisoning of a male adult.
(18) Ergotinine and other drugs in pills administered in an attempt to procure abortion.
(19) 66 grains powdered glass in pea soup.
(20) 0.3 grains Arsenic in portion of food which had caused death of a male adult.
(21) Tartar Emetic in wine.
(22) 9.87 grains powdered glass in pea soup.
(23) 4.62 grains Arsenic from portion of food which had caused death of a male adult.
(24) 18 grains powdered glass in tea.
(25) 5 grains Mercuric Chloride in soup.

183 certificates were issued to the Police for use in prosecutions, being an increase of 44 over the number for 1927, and 92 over 1926.

The total number of Police samples analysed, viz., 1,072, is an increase of 193 over last year, and 545 over 1926.

The number of human viscera, stomach contents and vomits examined, 66, is an increase of 17 over 1927, and 32 over 1926, whilst the number of substances examined for poison, 75, is an increase of 15 over 1927, and 14 over 1926.

These figures constitute a record, and are indicative of the ever increasing demands made on the Chemical staff of the Government Laboratory by the Police. Not only does this work very often entail long and exhaustive analyses in the Laboratory, but the subsequent attendance of the Chemist at Courts in distant parts of the Island to give evidence on behalf of the Crown.

The large increase in the number of Ganga and Ganga smoking exhibits examined points to increased vigilance on the part of the Police under the Dangerous Drugs Law, the number submitted being 669 as against 290 for 1927.

The 24 samples of Opium consisted of one pound packets of Raw Opium which were seized when attempts were made to smuggle the drug into the Island.

32 Medicines and Drugs were examined in connection with various prosecutions under the Medical Laws.

Five locally manufactured wines, which were labelled as being Port and Sherry, were submitted by the Police, and prosecutions were successfully conducted for misbranding under the Merchandise Marks Law.

Under the Produce Protection Law, 15 Orange Oils were analysed. All were found to be adulterated with from 5 to 45 per cent. of Petroleum (Kerosine Oil).

Only one sample of fresh milk was submitted by the Police under the Adulteration Law, and this was found to be adulterated. The sampling of fresh milks appears to be passing from the hands of the Police into those of the various Medical Officers of Health, at least in so far as Kingston and St. Andrew are concerned. In this respect it must be noted that of 19 samples of fresh milk submitted by the Medical

Officer of Health for Kingston, 48 per cent. were found to be adulterated, whilst out of 73 samples submitted by the Medical Officer of Health for St. Andrew, 30 per cent. were adulterated. These figures show the need for increased activity on the part of the Public Health Authorities.

Customs samples show a slight decrease as compared with the number for last year, the decrease being in the number of samples of Native Wines examined for drawback on the rum used in their manufacture.

Analyses of animal viscera were made f or the Department of Science and Agriculture in connection with the poisoning of calves by lead paint refuse which had been carelessly thrown about by painters engaged in repainting buildings at the Stock Farm.

Analyses of orange and grape fruit juices were also made on behalf of Professor Clarke Powell in connection with his investigations into the Citrus industry of the Colony.

For the Department of Public Works 45 waters were analysed, chiefly with reference to irrigation investigation.

AGRICULTURAL.

Seventy-seven samples were analysed under this head as compared with 67 for 1927.

Complete Physical Analyses of a number of soils were made on behalf of a large Fruit-growing Company in connection with irrigation problems.

The increased number of Agricultural Limes and Marls analysed, 42, as compared with 14 for 1927, is indic ative of the growing interest taken by planters in manurial problems.

GENERAL.

Under this heading 1,158 samples were analysed during the year, being an increase of 179 over last year.

The 736 analyses of milks from the Stock Farm showed that the quality of the milk from this source was well maintained, and the Public Institutions supplied from this source receive a quality of milk superior to that vended locally.

Sixty-two Cattle Dips, an increase of29 over last year, were tested for various owners of Dipping Tanks, and suitable recharges of Arsenite of Soda and Paranaph were recommended.

The number of rums, chiefly of the "High Ether" variety, and sugars, were about the same as last year.

The Kingston and St. Andrew water supplies were sampled and analysed quarterly, and the analysis demonstrated the maintenance of a good standard of chemical and organic purity throughout the year.

Eleven samples of steam coals and fuel oils were submitted on behalf of various shipping companies.

Various substances, principally foodstuffs, were analysed for private persons who suspected poison. In no case was a positive result obtained.

Samples of water analysed for industrial purposes, 11, were chiefly in connection with irrigation and boiler troubles.

Advice and assistance was given during the year to certain manufacturers of Pimento Oil, with regard to increasing the Eugenol content of their oils, resulting in their obtaining higher prices for their products.

The fumigation of large imported plants was carried out in the Fumigatorium at the Railway Wharf by means of Hydrocyanic Acid Gas. The Police were also supplied during the year with the necessary chemicals for the destruction of stray dogs caught on the streets of Kingston.

The experiments on the refining of Coconut Oil were held up owing to the absence of the Deputy Island Chemist on vacation. Promising results, however, were obtained in the working out of a simplified method of refining by the combined use of decolourising carbon and filtration through a Stream Line Filter, whereby the removal of mucilaginous and odiferous matter was effected, and the resulting oil showed less tendency to solidify.

Mention must be made of the Supreme Court Case of "Myers vs. Attorney General," which was tried in the early part f the year before Mr. Justice H. I.. C. Brown. Evidence was given by Mr. W. L. Barnett, Deputy Island Chemist, and also by Mr. E. N. Richards, Assistant to the Deputy Island Chemist, as well as other members of the Department of Science and Agriculture. The evidence adduced in this case, and also the learned judgment which was subsequently pronounced, brought the true facts to light and removed the stigma which had been unjustly applied to the Chemical Laboratory, and which had clouded the horizon since 1923. It is evident that in spite of the fact that the production of sugar is an important factor in the welfare of the Island, yet both the sugar producers, with very few exceptions, and the sugar merchants conduct their business according to rule of thumb methods in vogue some hundreds of years ago. It is a proved fact that raw sugar rapidly deteriorates, and this deterioration can cause a loss in sucrose contents of 1 per cent. per month, or even more. This deterioration can however be reduced by ensuring that the sugar is manufactured under chemical control, and by reducing the moisture content so that the ratio of the moisture to the non-polarisation is less than 1 is to 3. The installation and use of suitable drying machines in the sugar factories of Jamaica, and the observance of cleanliness and as far as possible, elimination of bacteria and moulds from the produce would result in material benefit.

Paranaph was manufactured throughout the year, and supplied at cost price to owners of Dipping Tanks. The sale of Arsenite of Soda, in original drums as received from the manufacturers, as well as other Insecticides proceeded as usual.

The following table gives the nature and amounts of materials issued to the public for the past three years:—

	1926.	1927.	1928.
Paranaph	29,778	29,954	37,353 lbs.
Arsenite of Soda	19,146	17,475	21,900 lbs.
Copper Sulphate	265	451	198 lbs.
Carbon Bisulphide	462	559	847 lbs.
Rat Poison in bulk	263	396	341 lbs.
Rat Poison in 1 oz. pkts. ..	200	272	96 pkts.
Standard Iodine solution ..	35,250	34,750	46,950 c.cs.
Thymol Powders	227	325	260 ozs.
Starch Solution	212	193	248 bottles
Soda Bicarbonate	41	39	60 bottles

The receipts for Laboratory fees and Sales for the past three years are as follows:—

	1926.	1927.	1928.
	£ s. d.	£ s. d.	£ s. d.
Laboratory Fees ..	160 11 6	201 10 0	213 0 0
Laboratory Sales ..	1,038 0 0	886 7 9	1,025 0 0

With reference to the above it must be pointed out that the policy of the Government is to sell commodities to the public at cost price, which is governed by the market prices prevailing at the time for the ingredients. This accounts for the fact that the values for Laboratory Sales in the second table are not strictly comparable with the figures shown in the first table, as the larger amounts sold during 1928, were sold at a much cheaper rate than formerly.

The Staff at the Laboratory is the same as last year, namely, the Deputy Island Chemist, two Assistants, Clerk and two Apprentices.

The Deputy Island Chemist was absent on vacation leave from the 4th June until the end of the year, during which time Mr. E. N. Richards officiated in the acting capacity.

The rapid increase in the amount of work done at the Laboratory, which is shown by the annual reports, together with the increasing demands made upon the skill of the Technical Staff, will soon render it incumbent on the Government to provide better Laboratory accommodation and to increase the Staff so that the Island may benefit accordingly.

W. L. Barnett, M.A., B.Sc., F.I.C.,
Deputy Island Chemist.

STAFF.

During 1928 the following changes of Staff took place:

Mr. C. C. Gowdey, Government Entomologist, died on the 19th March.

The loss of Mr. Gowdey in the prime of his career has been a very great blow to the Department. He has laid the first foundations of Agricultural Entomology in Jamaica, a branch of Agricultural Science which as time goes on will become of increasing importance to the planters of the Colony.

Miss V. M. Barrows was appointed Temporary Clerk vice Miss G. M. Morrison.

Miss D. E. Golding, Typist and Stenographer, was absent on half pay leave throughout the year owing to illness, Miss M. Sinclair filling the vacancy.

Mr. W. Cradwick, Senior Travelling Instructor, retired on pension on 22nd June.

Mr. J. Briscoe was promoted Senior Travelling Instructor, vice Mr. Cradwick, and Mr. L. A. Wates was appointed to succeed Mr. Briscoe as Junior Travelling Instructor.

From the 7th May to the 24th October, I was absent from the Colony on vacation leave. Dr. S. Lockett, Government Veterinary Surgeon, acted as Director of Agriculture during my absence.

Messrs. W. L. Barnett, Deputy Island Chemist, and J. Briscoe, Travelling Instructor, were also absent from the Colony on leave during a portion of the year.

Mr. A. F. Thelwell, Assistant Master at the Farm School, was seconded for service as Commissioner at the Canadian National Exhibition, Toronto, and was absent from the Colony from 21st July to 1st October.

I desire to record my thanks to Dr. Lockett who acted as Director and to Mr. E. N. Richards who acted as Island Chemist during my absence on leave and my appreciation of the successful and effective manner in which the work of the Department was carried on during my absence from the Colony.

H. H. Cousins,
Director of Agriculture and Island Chemist.